

INSTALLATION RESTORATION PI



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**FINAL DESIGN PACKAGE FOR
THE FS - 12 PRODUCT RECOVERY SYSTEM**

VOLUME III

**REPORT OF AIR SPARGING, SOIL VAPOR
EXTRACTIONS, AND PRODUCT RECOVERY PILOT
STUDIES CONDUCTED AT THE FS-12 SOURCE AREA
AUGUST 23, 1993 - OCTOBER 1, 1993**

**MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS**

JULY, 1994



Hazardous Waste Remedial Action Program
Oak Ridge, Tennessee 37831-7606
Managed by MARTIN MARIETTA ENERGY SYSTEMS, INC.
For the U.S. Department of Energy under contract DE-AC05-84OR21400

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CAPE COD, MASSACHUSETTS**

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Managed by Martin Marietta Energy Systems, Inc.
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under Contract DE-AC05-84OR21400**

JULY 1994

LIST OF ACRONYMS/ABBREVIATIONS

AOC	Area of Concern
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
EDB	Ethylene Dibromide
FS	Feasibility Study
GC	Gas Chromatograph
GPM	Gallons per minute
LEL	Lower Explosive Limit
MMR	Massachusetts Military Reservation
OVM	Organic Vapor Meter
ppb	Parts per Billion
ppm	Parts per Million
psi	Pounds per square inch
PVC	Polyvinyl Chloride
RI	Remedial Investigation
SCFM	Standard Cubic Feet per Minute
SF ₆	Sulfur Hexafluoride
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
USEPA	US Environmental Protection Agency

FS-12 PILOT STUDY

SUMMARY OF RESULTS

1.0 INTRODUCTION

A series of pilot studies were conducted from August 23, 1993 through October 1, 1993 to obtain key design parameters required to finalize an extraction system being designed to remediate a jet fuel source area that has been identified beneath a former fuel pipeline at Area of Concern (AOC) FS-12 at the Massachusetts Military Reservation. Source removal at AOC FS-12 is being conducted as a Time Critical Removal Action in accordance with the National Oil and Hazardous Substance Contingency Plan (reference letter from Daniel W. Santos to Mr. Paul Marchessault, dated June 28, 1993, Subject: Removal Action - AOC FS-12). The pilot studies were conducted to evaluate the implementability and effectiveness of air sparging, soil vapor extraction and free product pumping technologies for remediation of petroleum contaminated soil and groundwater in the AOC FS-12 source area.

1.1 GEOLOGIC SETTING OF THE FS-12 PILOT STUDY AREA

The pilot study area and the area of the full scale soil vapor extraction/air sparging system is located entirely within the Mashpee pitted plain. Previous investigations and recent subsurface data, indicate the substrata consists of outwash sands and gravels with discontinuous lenses of fine sand, silt and clay down to at least a depth of 130 feet below the water table. In previous investigations these lenses were encountered below the study area at depths of 170 feet below grade. Data regarding the underlying basal sediments and bedrock are not available for this area. The geologic cross sections that were prepared as part of the Remedial Investigation Report are included in Appendix K.

1.2 HYDROGEOLOGIC SETTING FOR THE FS-12 PILOT STUDY AREA

The study area is underlain by the Cape Cod Aquifer. Locally, the sands and gravels of the aquifer serve as a primary source of drinking water source for municipal and residential water supply wells. The aquifer is unconfined with an average depth to water in the study area of 90 feet. The water table is exposed at the surface in Snake Pond, which is south-southwest of the study area. Groundwater flow in the study area is generally to the south-southeast with a estimated horizontal velocity of 0.15 ft/day. Reported horizontal hydraulic conductivities in the area range from 150 to 400 ft/day.

1.3 EXTENT OF CONTAMINATION

The pipeline leak has created an area of contaminated soil of approximately 11 acres. Figure 1.1 details the horizontal extent of the soil contamination. The vertical extent of the soil contamination is a 10 to 20 foot layer above the water table. The estimated amount of residue hydrocarbons in the soil across the 11 acre site is approximately 395,000 pounds.

During the December 1992 to January 1993 free product site investigation thin levels of floating product ranging in thickness from 0.06 to 0.67 feet were detected in six wells. Figure 1.2 delineates the extent of the floating product from the free product site investigation. These wells were rechecked again during the pilot study activities and only two wells (WT-13 and LWA-1) had any measurable thickness of product. Additionally, all of the wells installed as part of the pilot study were free of product. A review of historical water level data (Figure 1.3) indicates that the groundwater levels were at historic lows during the December 1992 time frame. The groundwater levels were approximately three feet higher at the time the pilot studies were conducted. One explanation of this phenomena is the smearing of the product as the water table rises, thus leaving a zone of contaminated soil below the water table and no product remaining on top of the water table.

Analysis of groundwater samples taken during the product recovery pilot study indicate that the groundwater underlying the contaminated soil has also been impacted by the pipeline leak. These samples were analyzed for BTEX and EDB and were taken from well PR-1. A summary of the results are tabulated in Table 1.1 below.

TABLE 1.1 - GROUNDWATER ANALYSIS RESULTS FROM PRODUCT RECOVERY PILOT STUDY		
COMPOUND	Maximum Conc. (ppb)	Minimum Conc. (ppb)
Benzene	68	9.7
Toluene	13000	6100
Ethylbenzene	1300	580
Xylenes	4870	721
EDB	ND	ND

Previous investigations at the FS-12 source area indicate similar problems with contaminated groundwater. The levels of BTEX and EDB from these investigations were similar to the product recovery test results. See the Draft RI Report for the FS-12 Study Area, dated December 1993, for additional data.

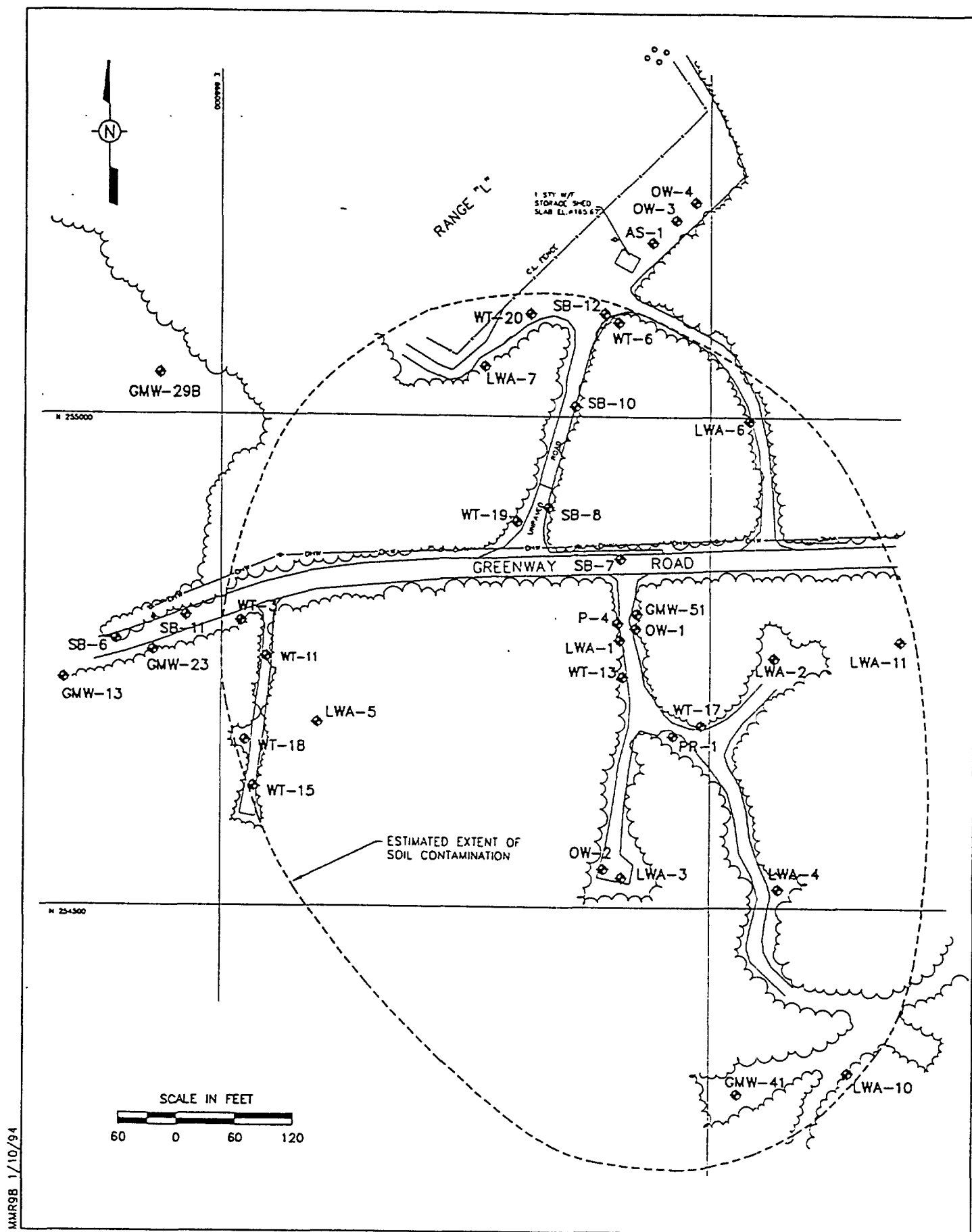


FIGURE 1.1 SOIL CONTAMINATION

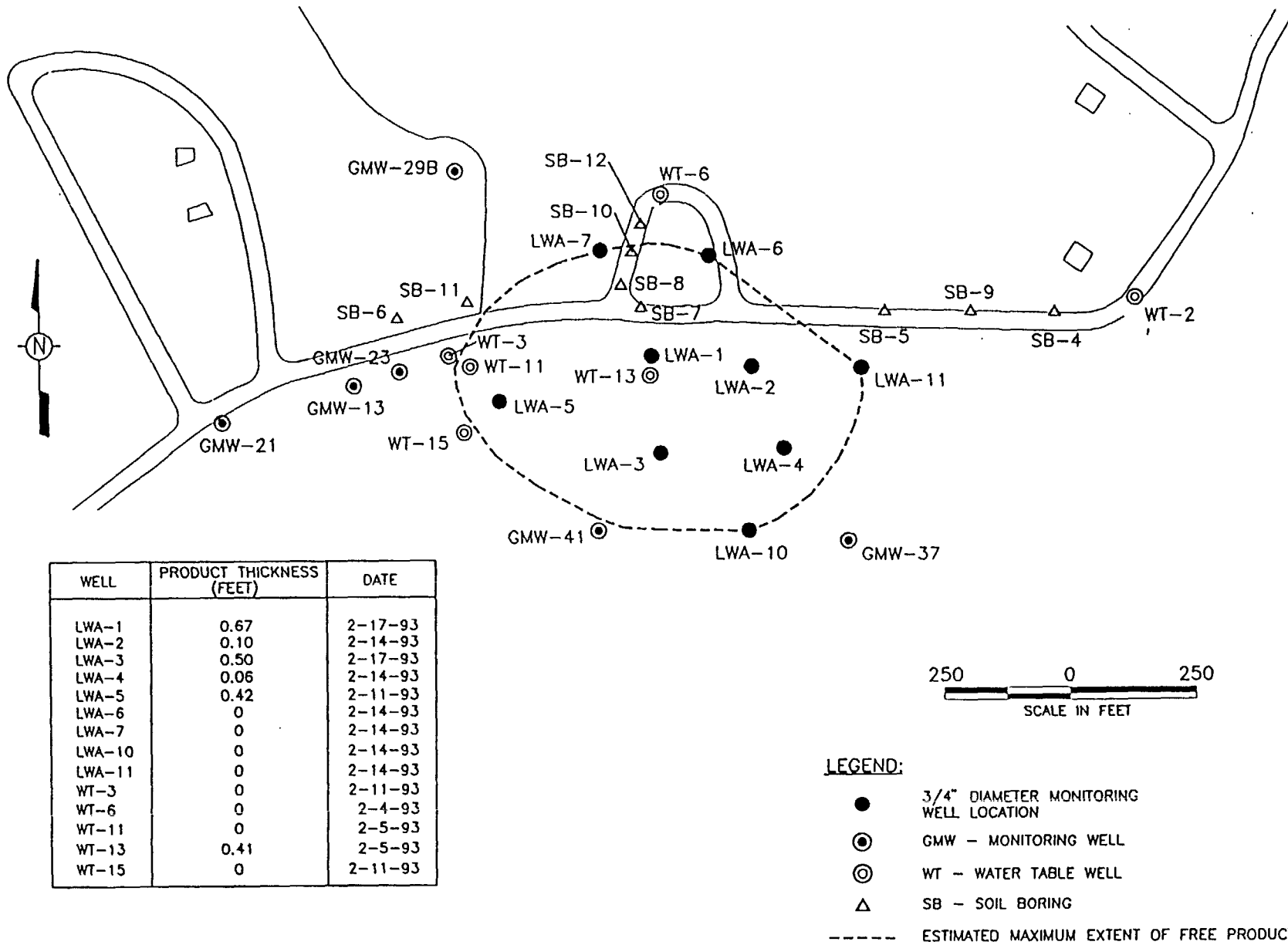
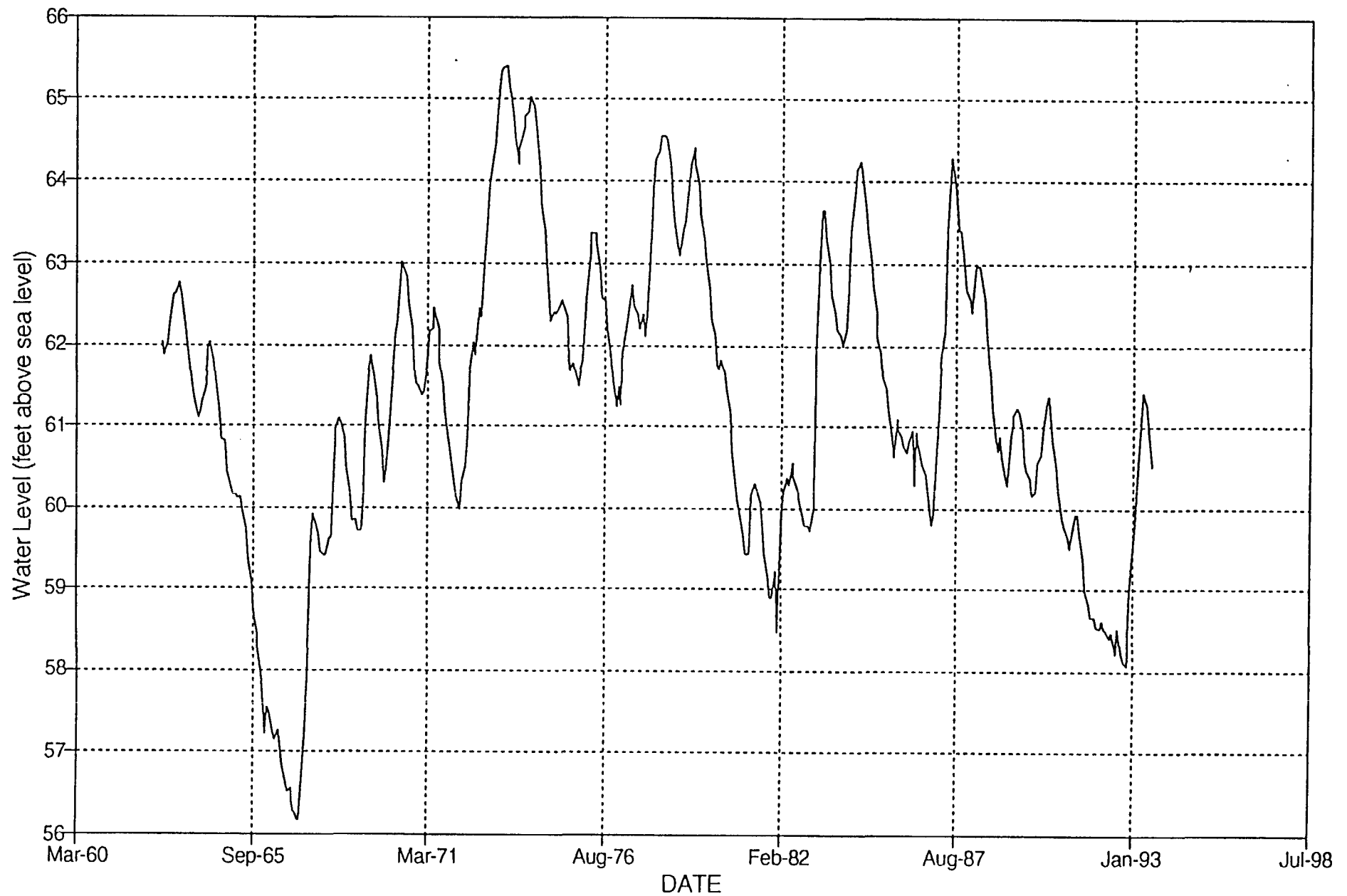


FIGURE 1.2 FREE PRODUCT DIAGRAM

Figure 1.3 USGS Groundwater Levels
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2.0 AIR SPARGING PILOT STUDY

2.1 PILOT STUDY LAYOUT

The air sparging pilot study was conducted north of the contaminated area near the L-range. One existing well (WT-6) was used as a monitoring point and three additional wells (OW-3, OW-4 and WT-20) were installed for monitoring points. One air sparging well (AS-1) was installed for the pilot study. Figure 2.1 shows the locations of the air sparging pilot study wells. Table 2.1 shows the distances from the monitoring wells to the sparging wells.

Table 2.1	
Well	Distance to Sparging Well AS-1 (feet)
OW-3	33
OW-4	61
WT-6	87
WT-20	144

2.2 AIR SPARGING PILOT STUDY SYSTEM DESCRIPTION

The air sparging pilot study system consisted of the following:

- one sparging well (AS-1) and four observation wells (OW-3, OW-4, WT-6 and WT-20)
- a 125 Standard Cubic Feet per Minute (SCFM) air compressor,
- the tracer gas Sulfur Hexafluoride (SF_6) cylinder and controls,
- valves, gauges, and flow meters for controlling and monitoring the system.
- pressure transducers, datalogger and air sampling equipment,
- submersible pump and controller for groundwater sampling,
- diesel generator to provide power for the sampling pumps.

Figure 2.2 details the air sparging pilot study system.

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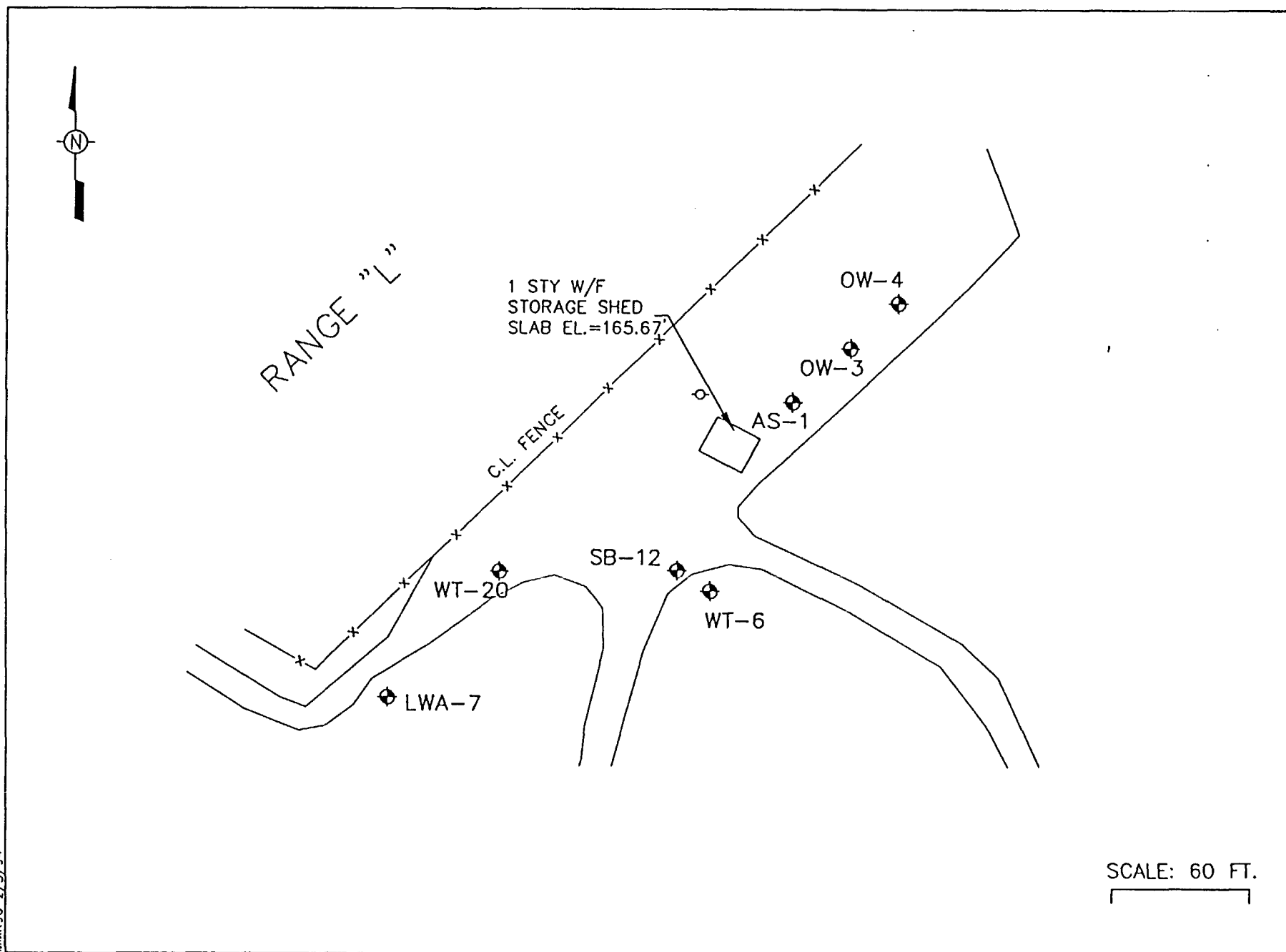


FIGURE 2.1 LOCATIONS OF AIR SPARGING PILOT STUDY WELLS

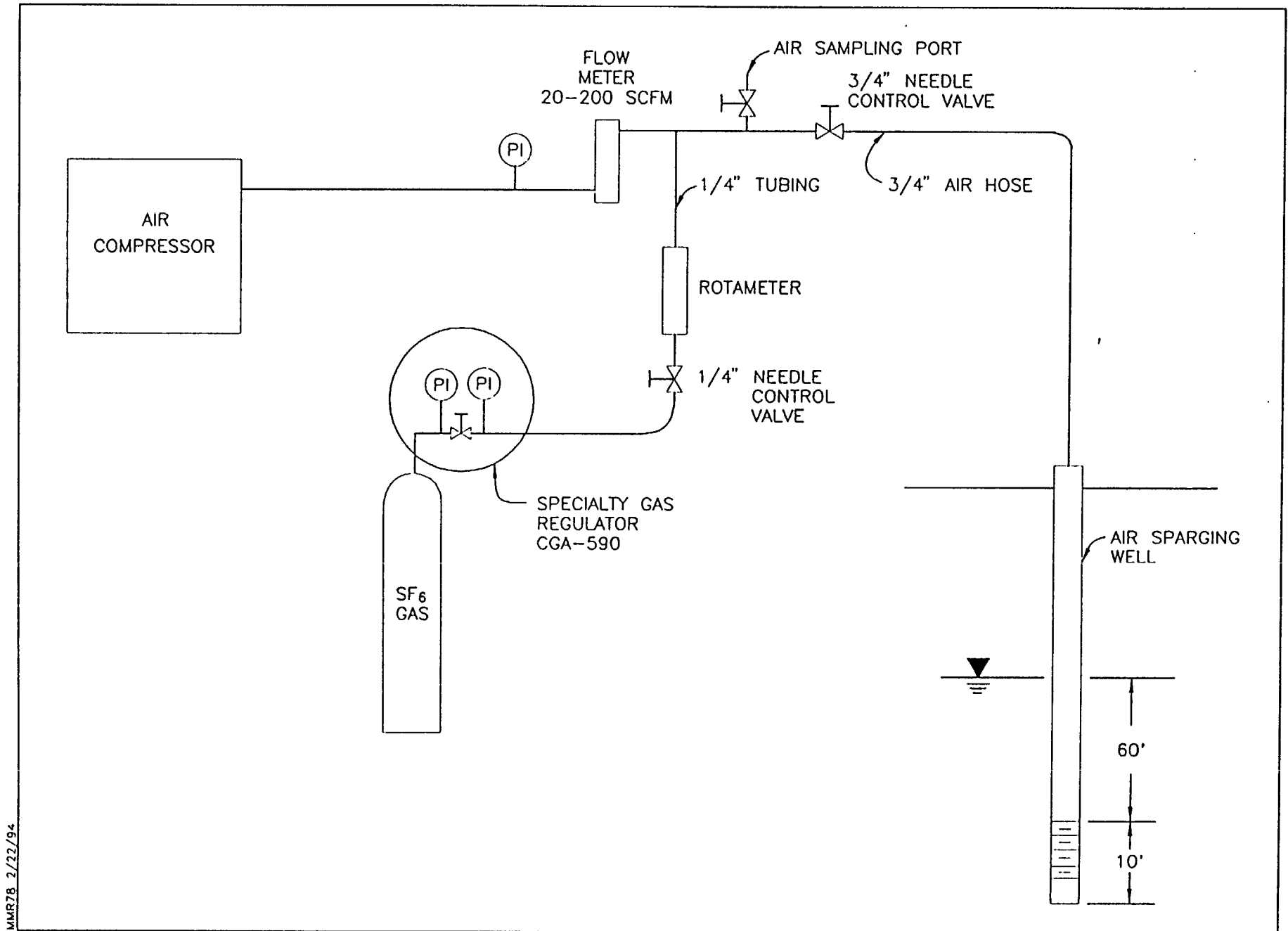


FIGURE 2.2 AIR SPARGING PILOT STUDY SYSTEM

2.2.1 Air Sparging and Observation Well Descriptions.

The air sparging well was constructed of 2-inch diameter schedule 80 PVC riser with 10 feet of stainless steel screen. The top of the well screen was placed 60 feet below the water table. The existing water table well WT-6 was used as one of the observation wells for this pilot study. The other three observation wells were constructed of 2-inch diameter schedule 80 PVC risers with 20 feet of stainless steel screen. The top of the each screen was placed 10 feet above the water table. The boring logs, monitoring well construction logs and well development logs from the installation of the wells are included in Appendix A.

2.2.2 Air Compressor and Associated Equipment

The air compressor that was used during the pilot study was capable of delivering 50 to 115 SCFM at pressures that varied from 32 to 40 psi. The air compressor was connected to the air sparging well by means of a 3/4-inch diameter hose. The air flow was monitored by a pressure indicator and a flow meter. The total air flow was controlled by a 3/4-inch diameter needle valve that was located downstream of the SF₆ tubing tee.

2.2.3 Tracer Gas

SF₆ was used as the tracer gas for this pilot study. SF₆ is a inert gas that is not normally found in the environment. It is a non-toxic material and its easy detection made it an ideal candidate for use as a tracer for the air sparging pilot study.

The analysis of sulfur hexafluoride supporting Air Sparging pilot study was done by using a Thermo Environmental Instruments Inc. Model 621A GC equipped with a six feet 1/8" OD stainless steel column pre-packed with 100 mesh molecular sieve for gas analysis, an Electron Capture Detector, a Linear Model 142 external strip chart recorder with the full scale span from 1 mV to 100 V for signal recording, and a PHOTOVAC 380241 digital flowmeter for carrier gas flow rate calibration and monitoring. The carrier gas was an instrument grade 5% methane in argon purchased from the Air Product Inc. An one ppm certified master sulfur hexafluoride in nitrogen purchased from Scott Specialty Gases, Inc. was used as stock standard gas for GC calibration and quality assurance. Tedlar bags were used as standard gas and sample containers. Gas tight syringes at different sizes were used for standard and sample transferring. The GC operation settings were oven temperature at 75 °C, column head pressure at 20 psi, and carrier gas flow rate at 24.0 ml/min. Calibration was done every morning prior to the sample analysis using a set of 10 ppb, 100 ppb, 250 ppb, and 500 ppb of sulfur hexafluoride prepared daily. Calibration curve was then established for qualitative and quantitative analysis. Sample dilutions were made when necessary to lower the response signals into the calibration range. The peak height method was used for data interpretation.

The SF₆ cylinder was connected to the air supply line with 1/4-inch tubing. The SF₆ was added to the air flow at a rate that would give a concentration of approximately 50 parts per million to the air being injected into the air sparging well. A sampling port was added to the main air supply line after the tee for the SF₆ tubing and the concentration of the SF₆ in the air was verified by GC testing. The SF₆ flow was controlled with a pressure regulator valve attached to the gas cylinder and by a needle valve added to the 1/4-inch gas supply tubing. The flow of gas into the air line was monitored by a rotameter added to the 1/4-inch tubing.

2.2.4 System Operation

The pilot study was performed to establish the following parameters:

- Radius of influence of the air sparging well at different sparging flow rates,
- Optimum flow rate and pressure,
- Dissolved oxygen levels in the groundwater and oxygen and carbon dioxide levels in the vadose zone air directly above the water table.

The system was operated with various flow rates and pressures. Flow rates were adjusted from 50 to 115 SCFM and the corresponding pressures were from 32 to 40 psi. The system was operated at least six hours at each flow rate.

2.2.5 System Monitoring

The three observation wells (OW-3, OW-4 AND WT-6) were monitored or sampled for the following attributes during system operation:

- Water level changes in the observation wells were monitored and recorded before, during, and after system operation with a datalogger. Water levels were monitored after operation until they stabilized.
- Air pressure changes in the observation wells were monitored and recorded continuously during system operation with a datalogger,
- Air samples from the observation wells were collected and analyzed for oxygen, carbon dioxide and sulfur hexafluoride before system operation and every hour during system operation. After the system was shut down air samples were taken every hour for a period of at least two hours and analyzed for similar parameters.
- Groundwater samples from the observation wells were collected and analyzed for oxygen and carbon dioxide content before system operation and every hour during system operation. After the system was shut down groundwater samples were taken every hour for a period of at least two hours and analyzed for similar parameters.

Monitoring well WT-20 was used only to monitor water level changes during the 100 and 115 SCFM flow rates.

Figure 2.3 shows the observation well monitoring details.

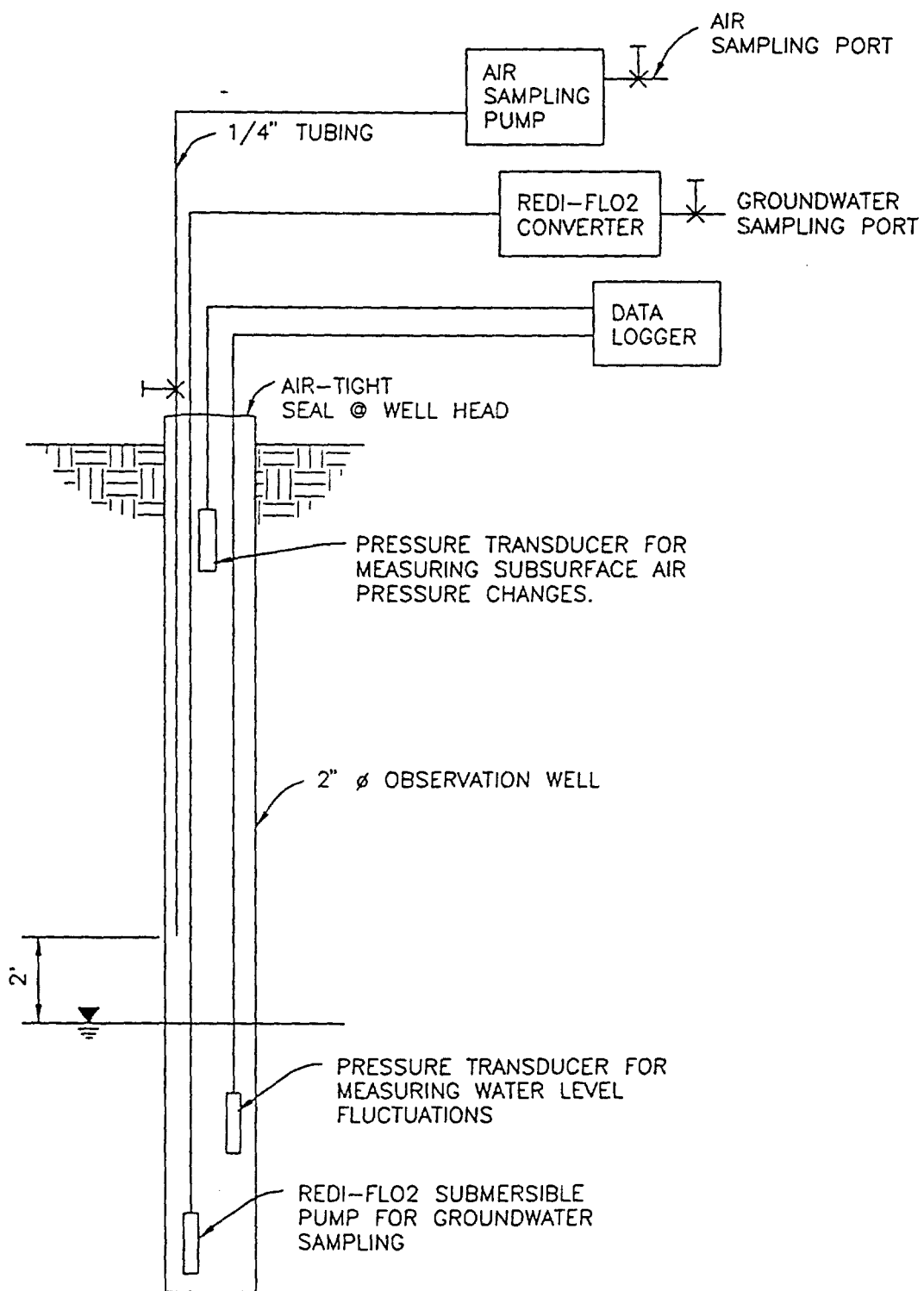


FIGURE 2.3 OBSERVATION WELL-MONITORING DETAILS

2.3 AIR SPARGING RESULTS

The air sparging pilot testing was conducted for four consecutive days. The field logs for the air sparging pilot study are included in Appendix B. The data collected by the dataloggers and plots of the logged data are included in Appendix C.

The pilot study was operated with increasing flow rates each day of testing. Table 2.2 below shows the operating parameters for each day of system operation.

TABLE 2.2 - OPERATING PARAMETERS			
DAY	FLOW RATE (SCFM)	INJECTION PRESSURE (PSI)	Duration of Test (Hours)
8/26/93	50	32	7.75
8/27/93	75	34	7.32
8/28/93	100	38	7.00
8/29/93	115	40	6.15

2.3.1 Air Pressure Changes

The air pressure changes in the vadose zone were measured with transducers lowered into the observation wells and with the top of the well sealed. The results would indicate that OW-4 located 61 feet from the air sparging well was that most distance observation well to see major air pressure changes. Observation well WT-6 did show a discernable pressure change during the pilot study, but it was much smaller than the pressure changes measured in OW-4. Figures 2.4 and 2.5 show the maximum air pressure changes measured in each observation well.

Figure 2.4 Maximum Air Pressure Changes
Air Sparging Pilot Study

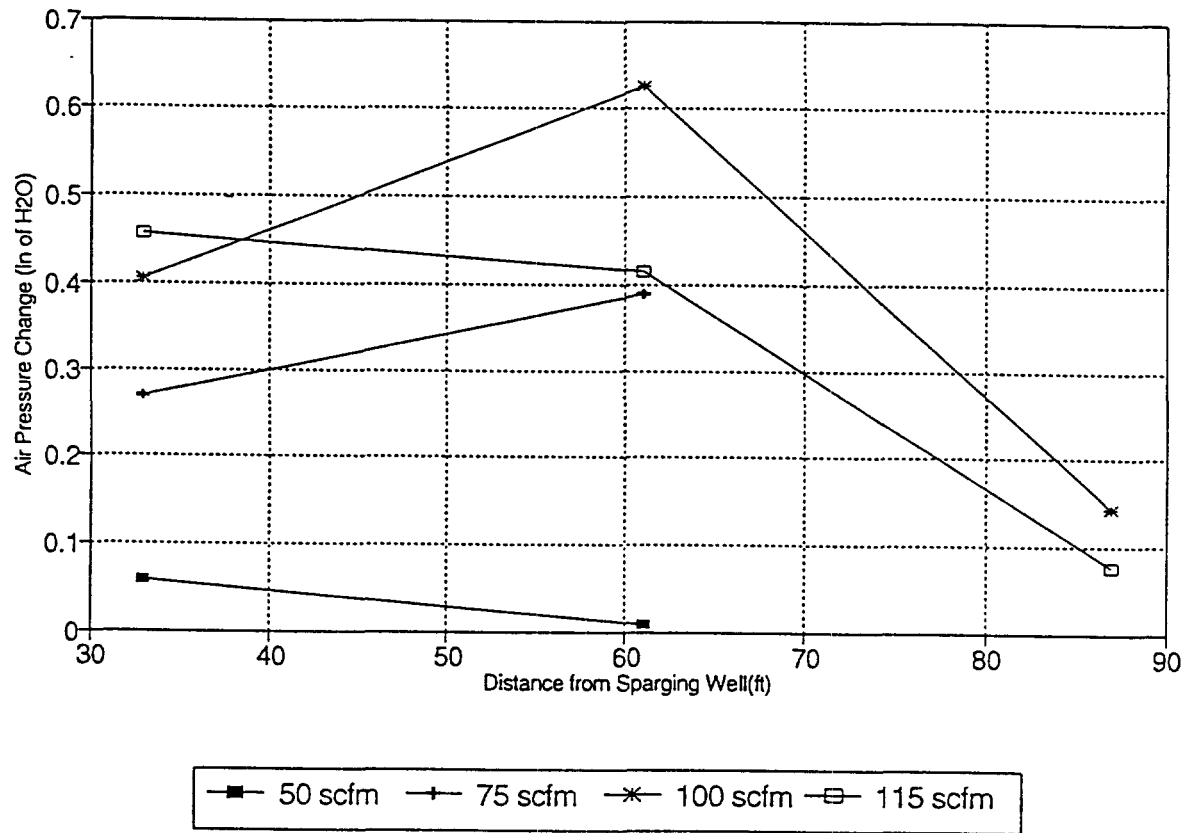
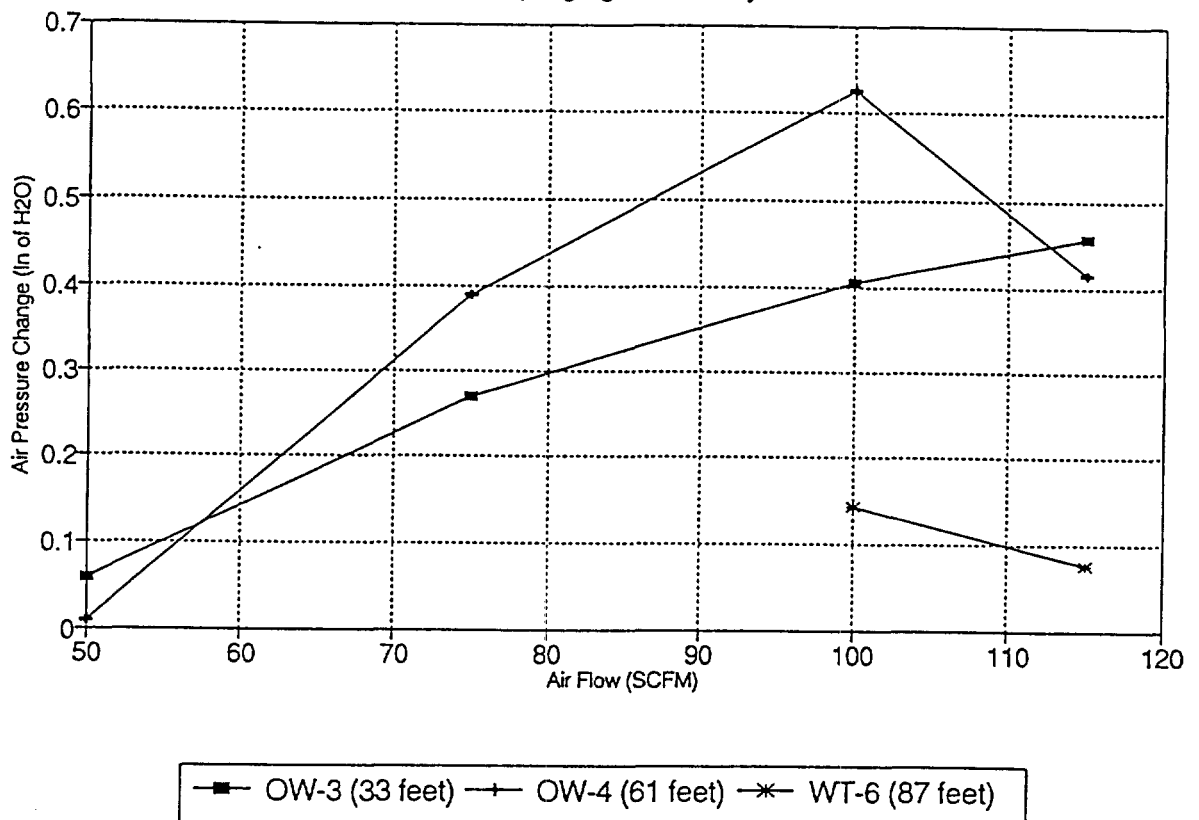


Figure 2.5 Maximum Air Pressure Changes
Air Sparging Pilot Study



2.3.2 DO MEASUREMENTS

DO measurements were taken on water samples extracted from each observation well. The results indicate that the DO levels reached the saturation point at a minimum of 61 feet from the air sparging well. The DO levels did show a change at 87 feet but did not reach the saturation point. Figures 2.6 and 2.7 illustrate the changes in DO readings in each observation well.

2.3.3 O₂ AND CO₂ MEASUREMENTS

O₂ and CO₂ measurements were taken on samples of air extracted from the observation wells at the vadose zone. The samples were collected from approximately two feet above the water table. The O₂ results indicate that the air sparging was successful in increasing O₂ levels in the vadose zone to atmospheric levels. The CO₂ results indicate that the CO₂ levels in the vadose zone were reduced to close to atmospheric conditions. The injected air was able to spread out at least 87' from the sparging well. Figures 2.8 and 2.9 show the measured O₂ and CO₂ concentrations in each observation well.

2.3.4 WATER LEVEL CHANGES

Water levels changes were measured with transducers lowered into each of the observation wells. After the first two days of testing an additional transducer was added in monitoring well WT-20. WT-20 is located 144 feet from the air sparging well. The testing showed substantial water table rises during the testing. The largest changes occurred in the closest two wells. Figures 2.10 and 2.11 document the water table rise results.

Figure 2.6 Maximum DO Readings
Air Sparging Pilot Study

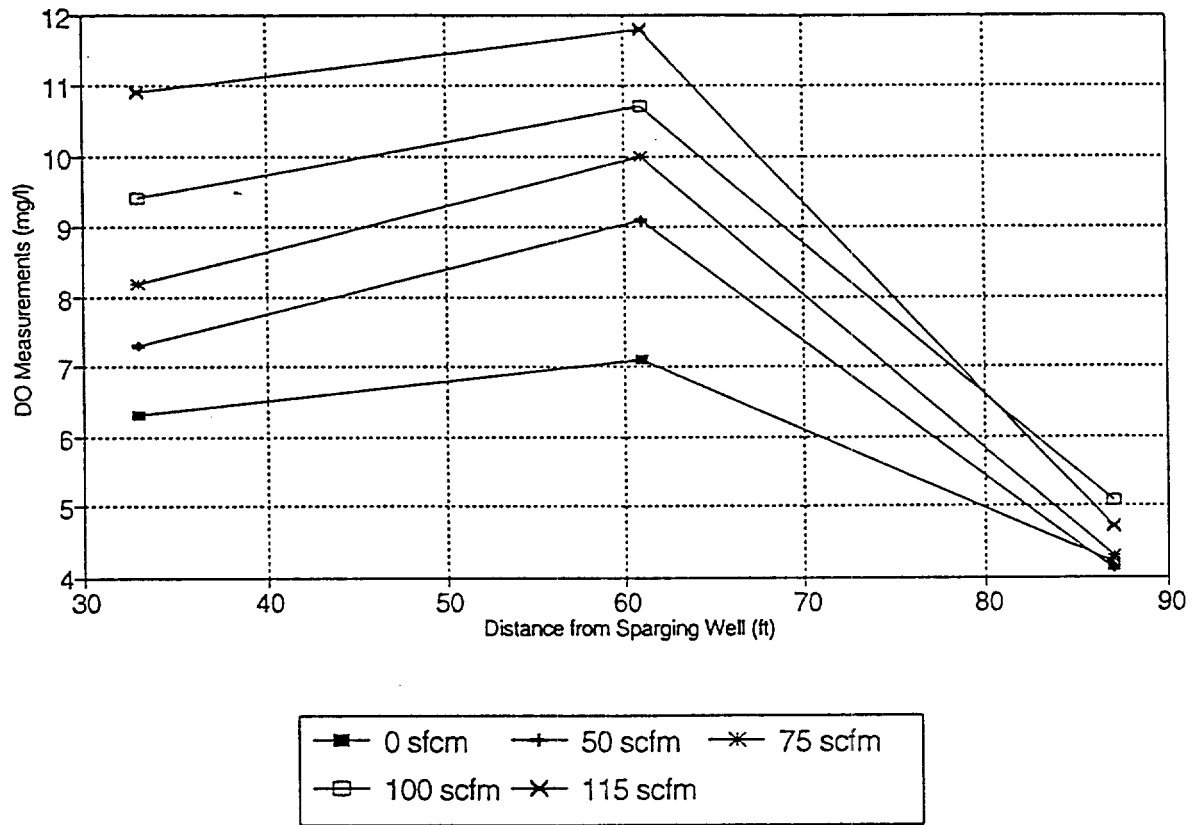


Figure 2.7 Maximum DO Readings
Air Sparging Pilot Study

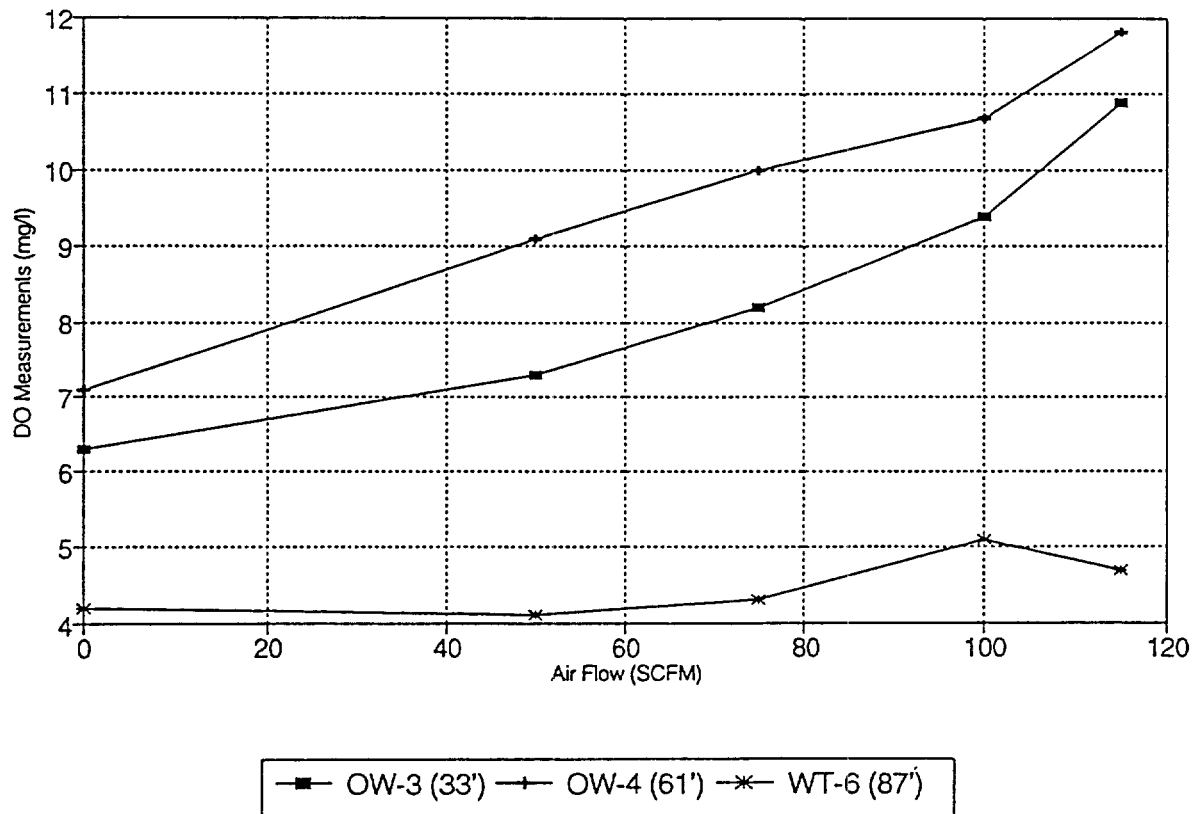


Figure 2.8 Maximum O2 Measurements
Air Sparging Pilot Study

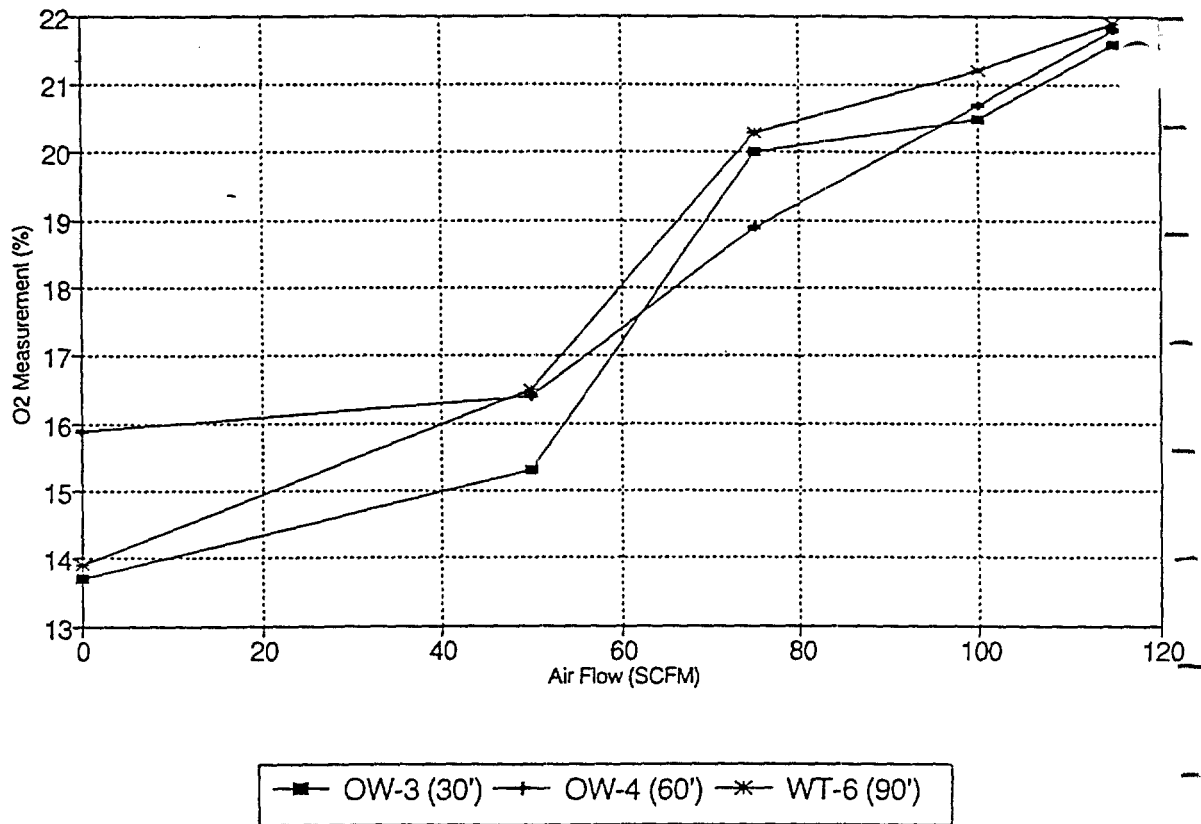


Figure 2.9 CO2 Measurements
Air Sparging Pilot Study

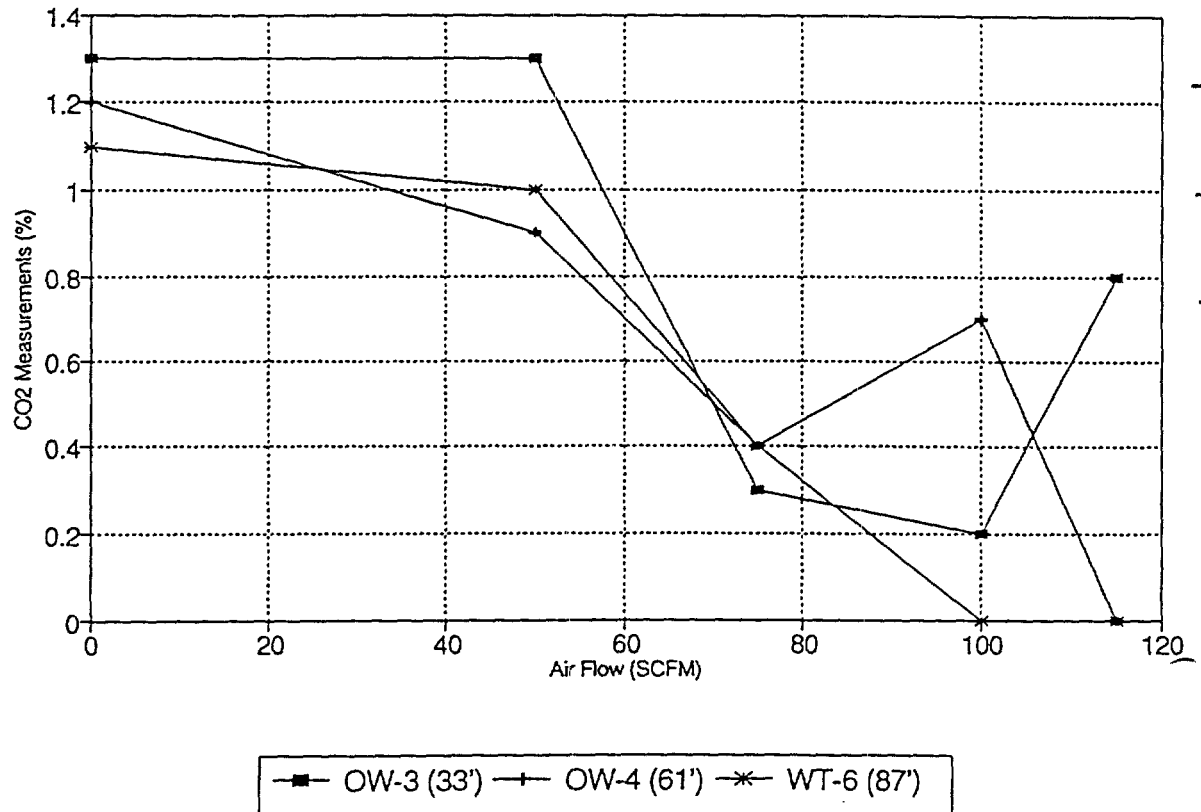


Figure 2.10 Maximum Water Level Changes
Air Sparging Pilot Study

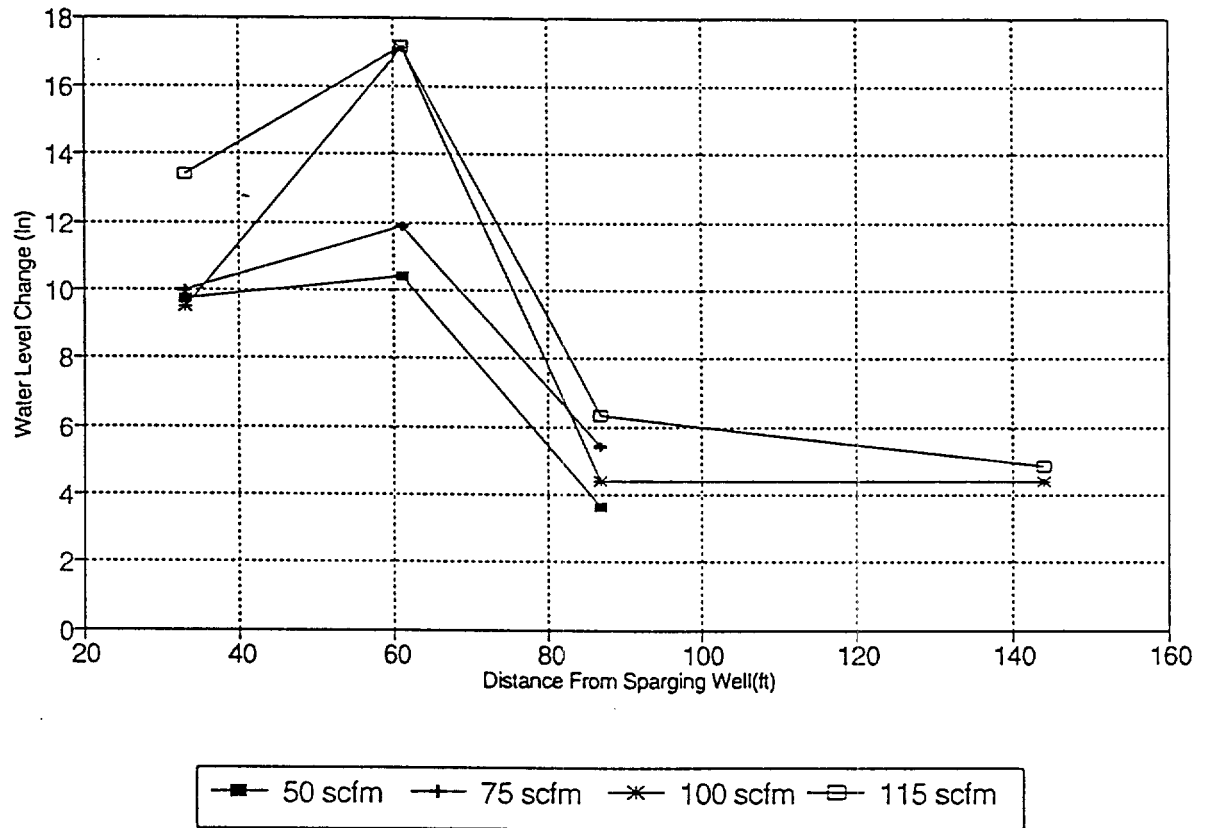
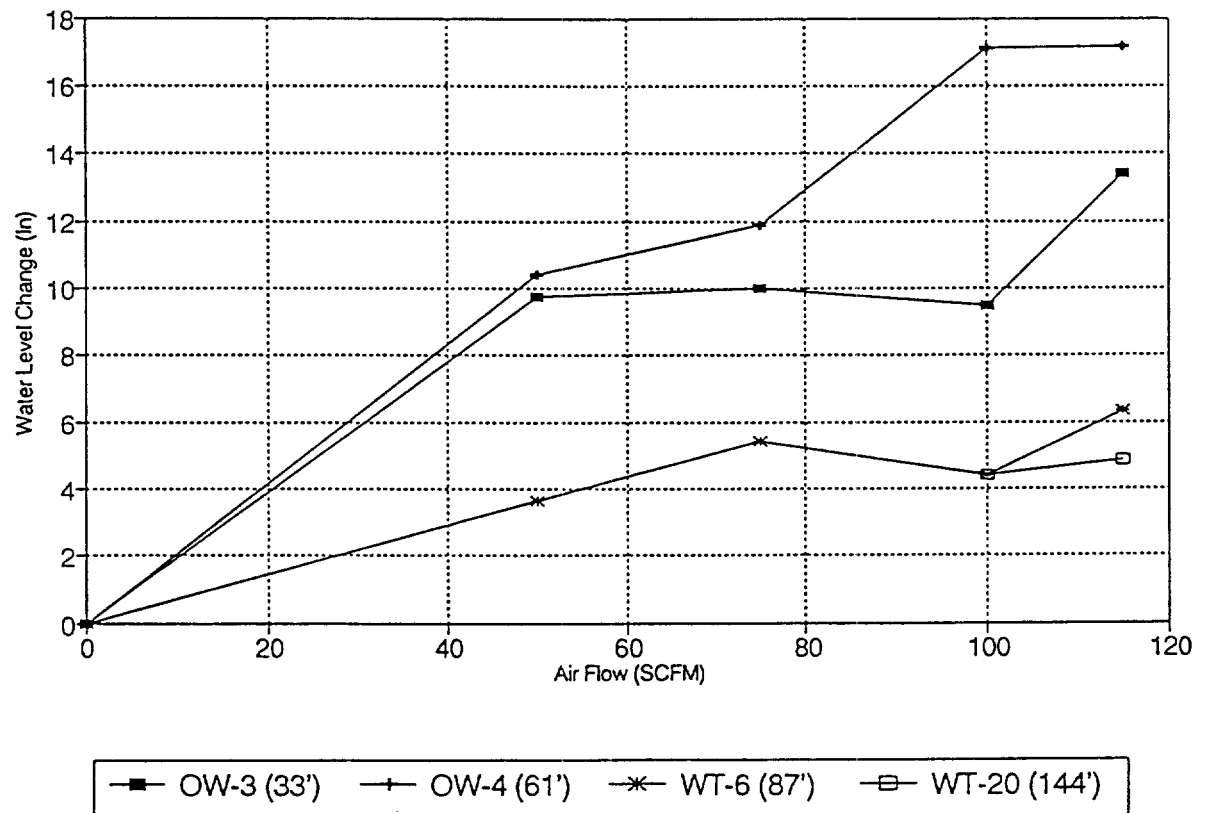


Figure 2.11 Maximum Water Level Changes
Air Sparging Pilot Study



2.3.5 SF₆ TRACER GAS

SF₆ was used as a tracer gas during this pilot study. The SF₆ was injected at a rate of 50 ppm into the injected air. The results indicated that the SF₆ spread throughout the pilot study area and was detected in large quantities even in the farthest well. The 50 ppm concentration that was used was much too high and the results could only be used as an indicator of the effect of the air sparging. The operating results and problem areas of each day of operation are included in Table 2.3.

TABLE 2.3 TRACER GAS SYSTEM OPERATION	
Test No.	SF ₆ Flow Rate and Operation
AS-1 50 SCFM	Moisture from air compressor condensed and flowed into the rotameter before the SF ₆ Tracer gas flow was started. The tracer gas flow was not enough to dry out the rotameter so the amount the tracer gas flow could not be measured. The meter was dried out for use the next day.
AS-2 75 SCFM	The compressor system was started and ran until the moisture was removed and then the tracer gas was added to the system at a concentration of 50 ppm. At 75 SCFM this was a flow rate of 18 ml/min. The tracer was found in almost all of the samples. Most strongly in the closest two observation wells. Figure 2.12 presents the results.
AS-3 100 SFCM	Since so much tracer was found in the previous day's air samples the decision was made to not introduce any tracer gas this day and to allow the tracer to "flush" out the system.
AS-4 115 SCFM	The tracer was added to the system for two hours and the results are presented in Figure 2.13. The tracer was added to the air flow at a rate of 10 ml/min. This resulted in a concentration of approximately 18.5 ppm of tracer gas in the air flow.

The GC results for the air samples are included in Table 2.4 and Figures 2.12 and 2.13.

Table 2.4 Air Sparging Study Tracer Gas (SF6) Results

DATE	AS1 SAMPLE	OW3 ppm	OW4 ppm	WT6 ppm
08/25/93	1	0	0	0

DATE	AS2 SAMPLE	OW3 ppm	OW4 ppm	WT6 ppm	Time
08/26/93	1	1.521	0.192	0	10.2
08/26/93	2	1.241	0.201	1.299	11.2
08/26/93	3	1.316	0.231	0.285	12.2
08/26/93	4	1.275	0.233	0.218	13.2
08/26/93	5	1.358	0.295	0.144	14.2
08/26/93	6	2.341	0.488	0.115	15.2
08/26/93	7	2.439	2.456	0.185	16.2
08/26/93	8	2.472	2.472	0.037	17.2
08/26/93	9	2.472	2.472	0	18

DATE	AS3 SAMPLE	OW3 ppm	OW4 ppm	WT6 ppm
08/27/93	1	4.563	2.141	0
	2	2.093	-----	0

DATE	AS4 SAMPLE	OW3 ppm	OW4 ppm	WT6 ppm	Time
08/28/93	1	2	0.672	0	8.5
08/28/93	2	2.078	2.172	0	10.2
08/28/93	3	2.063	2.218	0.125	11.2
08/28/93	4	2.093	2.203	0.066	12
08/28/93	5	2.093	2.031	0.021	13.5
08/28/93	6	2.093	-----	0	14.2
08/28/93	7	2.093	-----	0	15.2
08/28/93	8	2.078	-----	0	16
08/28/93	9	1.969	-----	0	17

Figure 2.12 Air Sparging Tracer Results
75 SCFM Flow Rate

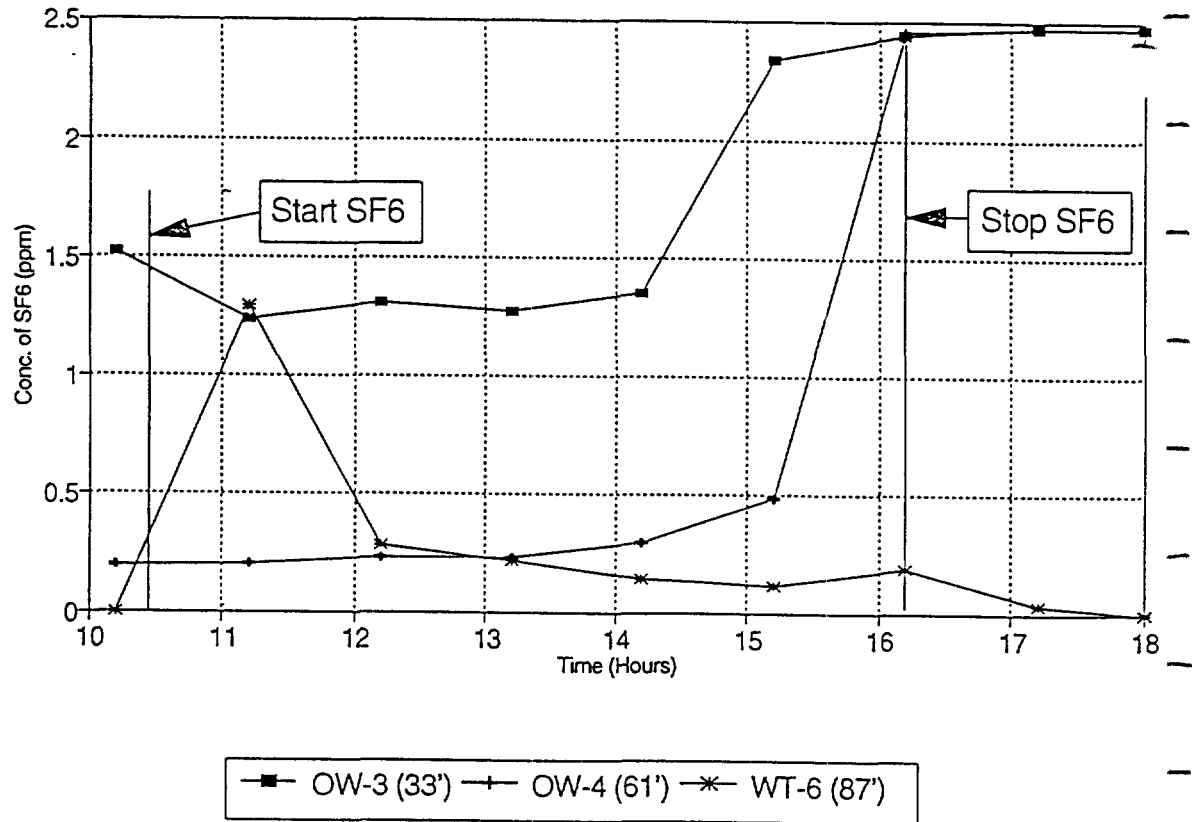
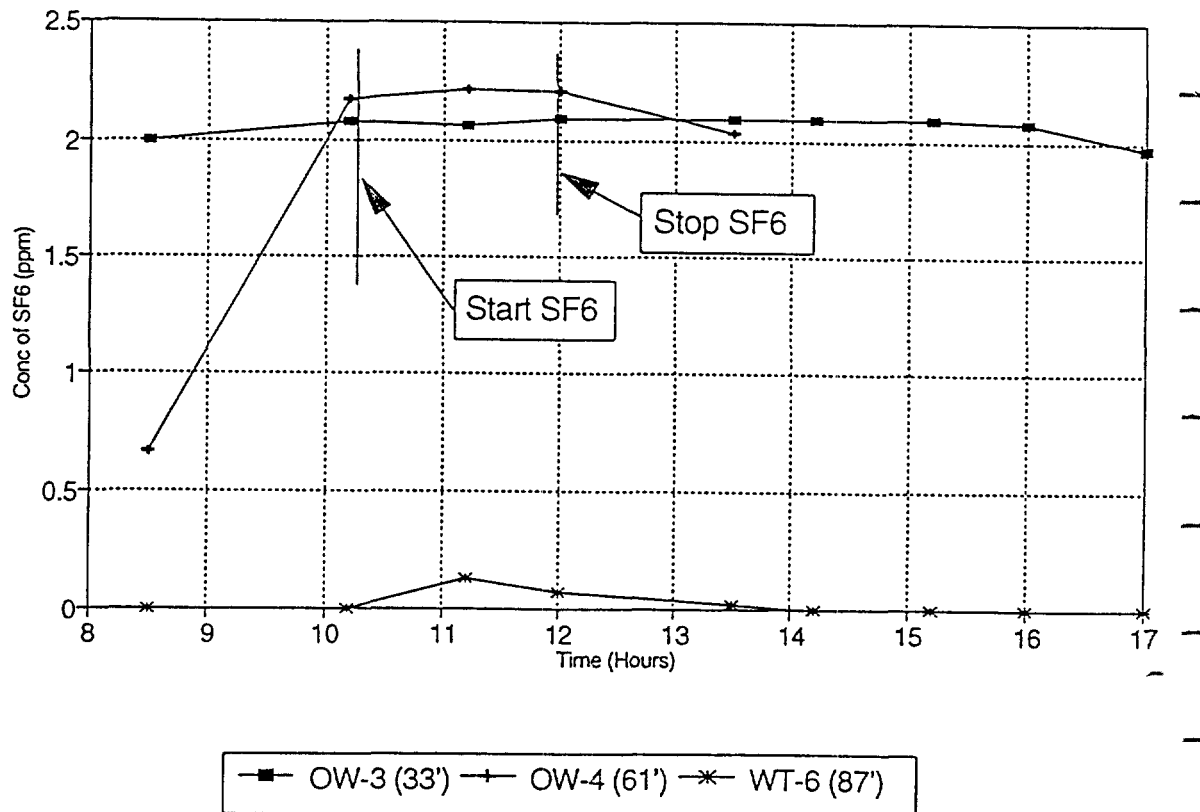


Figure 2.13 Air Sparging Tracer Results
115 SCFM Flow Rate



2.3.6 Summary of Results

Table 2.5 shows the measured radius of influence measured by each of the different parameters measured during the air sparging pilot study.

TABLE 2.5 MEASURED RADIUS OF INFLUENCE	
PARAMETER	RADIUS OF INFLUENCE
Water Levels	144'
Tracer Gas	87'
Oxygen Levels in Vadose Zone	87'
Carbon Dioxide Levels in the Vadose Zone	87'
Air Pressure	87'
Dissolved Oxygen	87'

2.4 CONCLUSIONS

The air sparging pilot study was an unconditional success. The pilot system was able to effect change in the water table as far as 144' feet from the sparging well. The dissolved oxygen and vadose zone oxygen levels were raised to saturation levels, which will greatly increase the opportunity for biodegradation of the contamination in both the groundwater and the vadose zone. The air stripping action of the air sparging will also transfer contamination from the groundwater and contaminated soils into the soil vapor which then can be captured by the soil vapor extraction system. The system will be effective to the depths needed to remediate the contaminated ground water at the FS-12 site.

3.0 PRODUCT RECOVERY PILOT STUDY

3.1 PILOT STUDY LAYOUT

The product recovery pilot study was conducted south of Greenway Road in the middle of the suspected free product area, as defined during the December 1992 through January 1993 free product investigation. The primary purpose of the product recovery pilot system was to determine if the floating product that was discovered during the free product site investigation could be recovered with a water table drawdown type product recovery system. Well PR-1 was used as the product recovery well during the study. Three observation wells were installed (OW-1, OW-2 and WT-17) as monitoring points. One existing well (WT-13) was also used as a monitoring point. Figure 3.1 shows the locations of the product recovery well and the observation wells. Table 3.1 presents the distances from the product recovery well to the observation wells.

Table 3.1	
Observation Well	Distance to Product Recovery Well PR-1 (feet)
WT-17	31
WT-13	80
OW-1	117
OW-2	150

3.2 PRODUCT RECOVERY PILOT STUDY SYSTEM DESCRIPTION

The product recovery pilot study system consisted of the following:

- one product recovery well (PR-1) and four observation wells (OW-1, OW-2, WT-13, WT-17),
- a 75 gpm Grundfos groundwater depression pump,
- an ORS product recovery pump,
- an ORS controller to control the product recovery pump and to monitor the product tank,
- a diesel generator to provide power for the pumps and the air stripping system,
- two 55 gallon product drums,
- a trailer mounted ShallowTray™ air stripping system,
- a carbon polishing unit to treat the pumped groundwater before disposal.

Figure 3.2 details the product recovery pilot system.

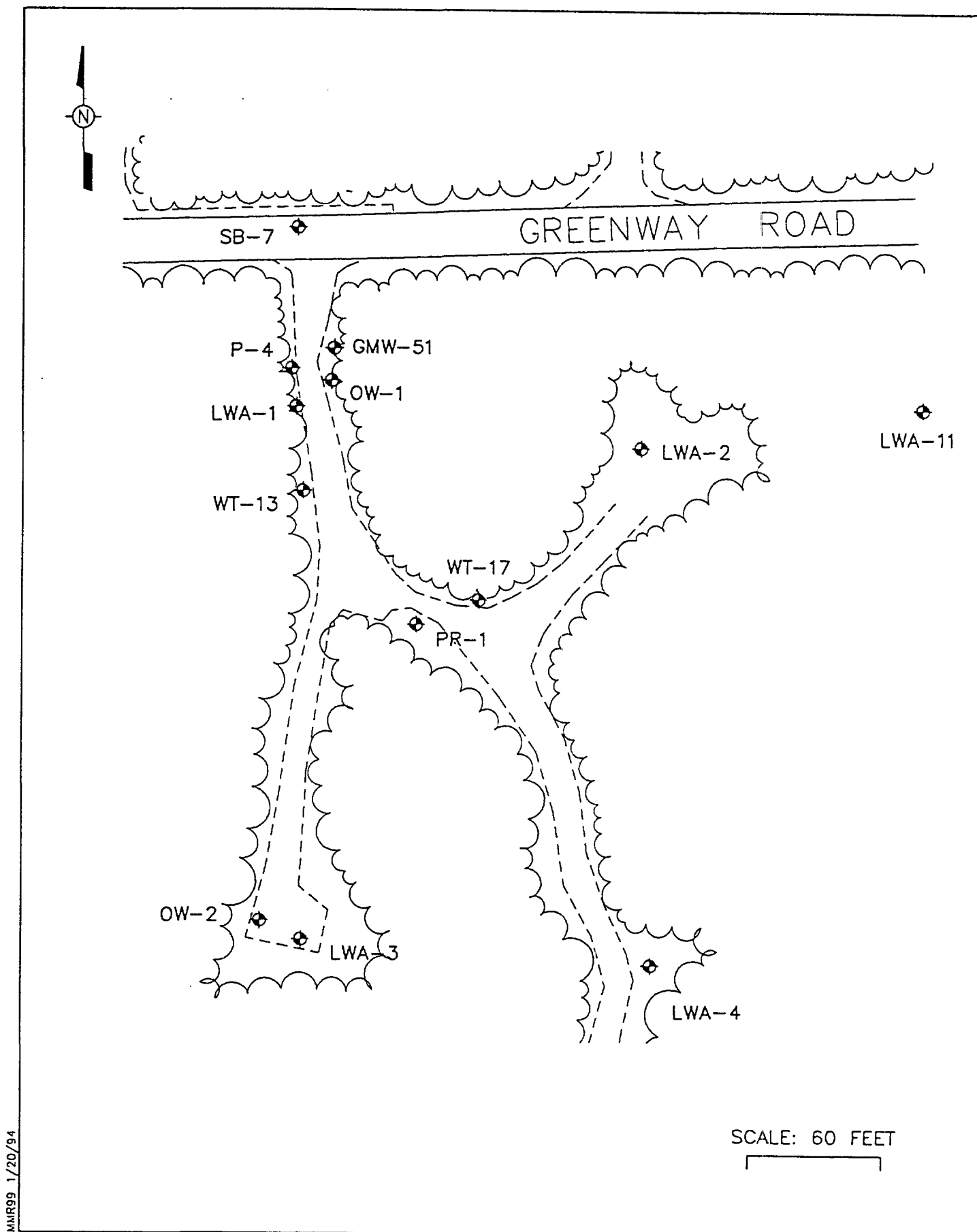


FIGURE 3.1 LOCATIONS OF PRODUCT RECOVERY AND OBSERVATION WELLS

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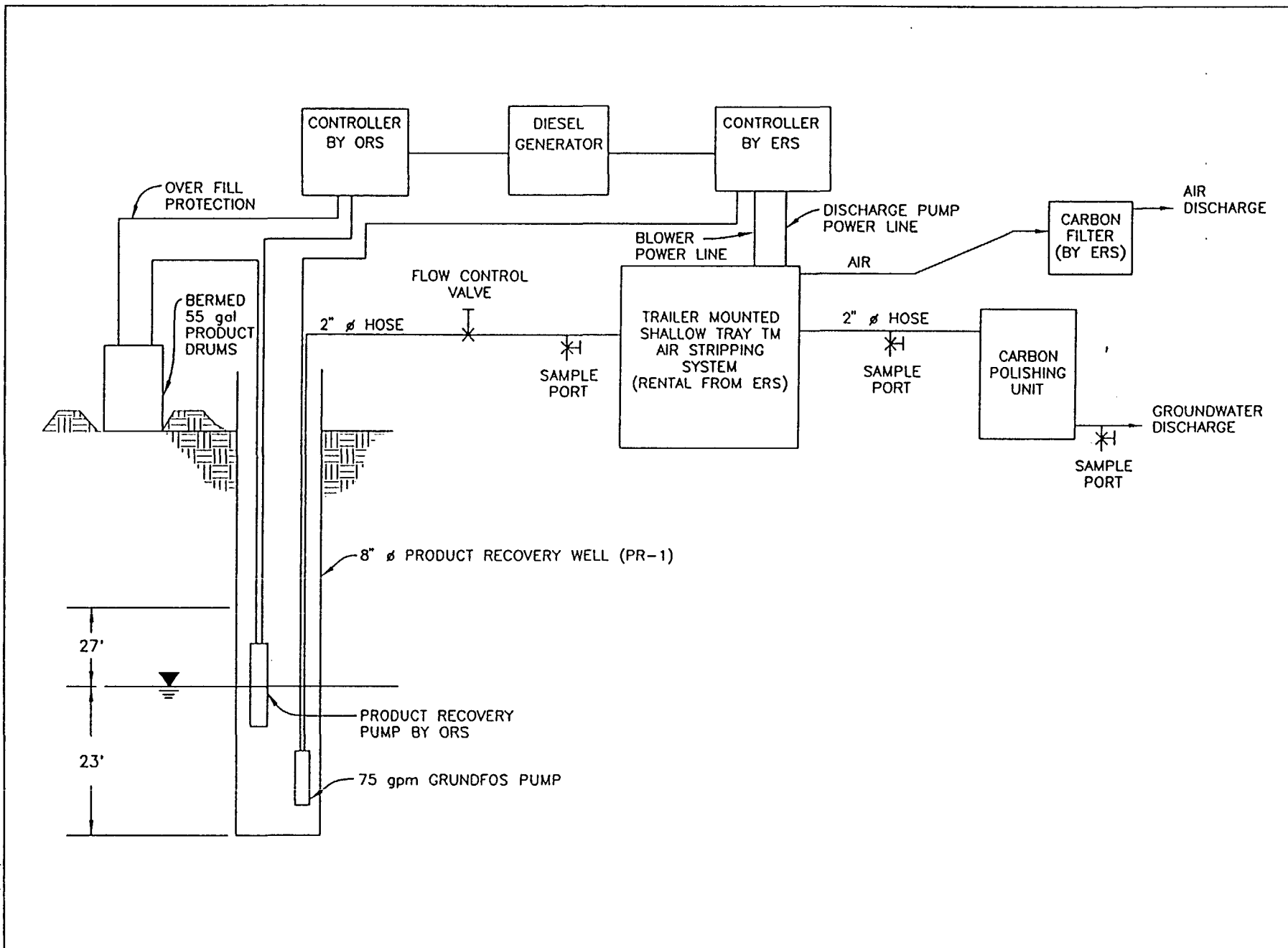


FIGURE 3.2 PRODUCT RECOVERY PILOT STUDY SYSTEM

3.2.1 Product Recovery Well and Observation Well Descriptions

The product recovery well (PR-1) was constructed of 8" diameter schedule 80 PVC riser with 50 feet of stainless steel screen. The top of the screen was placed 27 feet above the water table. One of the observation wells used for the pilot study was the existing water table well WT-13. The other three observation wells were completed specifically for this study and were constructed of 2" diameter schedule 80 PVC risers with twenty feet of stainless steel screen. The top of the screen was placed 10 feet above the water table for each well. The boring logs, well construction logs and well development logs for wells PR-1, WT-17, OW-1 and OW-2 are included in Appendix A. Soil sampling was conducted during the installation of these wells and a summary of the analytical data is included in Appendix D. The analysis methods used for the soil analysis included: USEPA Method 8020 for BTEX, USEPA Method 418.1 for TPH, and USEPA Method 415 for TOC.

3.2.2 Groundwater Depression Pump and Associated Equipment

The groundwater depression pump that was used for this pilot study was a Grundfos model 75S50-8. This is a 4" diameter stainless steel pump. This pump can produce from 45 to 95 gpm of flow. The pump was connected to the air stripper system by means of a 2" diameter pipe. A flow control valve and groundwater sampling port were installed in the pump discharge line before it reached the air stripper system. Power to the pump and control of the pump was provided by the air stripper control panel.

3.2.3 Product Recovery Pump and Controller

The product recovery pump used for the pilot study was a ORS Small Diameter Filter Scavenger™ hydrocarbon recovery system pump. This pump uses a floating intake cartridge that can travel up to one foot during changes in the water table level. The intake screen is a specially treated, oleophilic/hydrophobic mesh that allows hydrocarbons to enter the cartridge and repels water. This pump is capable of pumping from 0.25 to 0.5 gallons of product per minute.

The controller for the pumping unit is one specifically designed as part of the ORS product recovery system. It controls the product pump and it monitors the product recovery tank and will shut down the system if the tank becomes full.

3.2.4 Air Stripper System

The air stripping system used for treatment of the groundwater during the pilot study was a Model 2631 ShallowTray™ low profile air stripper provided by Environmental Restoration Systems Inc. This unit was a trailer mounted unit that contained all of the necessary accessories to receive, treat and discharge the pumped groundwater. This unit can treat up to 90 GPM of flow and has excellent removal rates for BTEX components. The air from the stripper was routed through a carbon filter before discharge to the atmosphere. The treated groundwater was routed to a carbon filter unit for polishing before discharge.

3.2.5 System Operation

The pilot study was performed to establish the following parameters:

- the rate of product recovery,
- the concentrations of BTEX and EDB in the pumped groundwater,
- the changes in the groundwater elevations due to the pumping of the groundwater,
- the effectiveness of the air stripping system and carbon polishing system in removing contaminants from the pumped groundwater.

The system was operated with groundwater pumping rates ranging from 50 to 82 GPM.

3.2.6 System Monitoring and Sampling

Data was obtained during the pilot study to evaluate the effectiveness and implementability of a free product pumping scheme. The data collected included water table level changes, product levels in the wells and product recovery rates. Samples of the pumped groundwater were collected and analyzed. The following are the sampling and monitoring activities that were conducted during the product recovery system operation:

- Water table levels in the pumping well and in the observation wells were monitored and recorded continuously during system operation using pressure transducers and a datalogger.
- Product thicknesses in the observation wells and in the pumping well were checked and measured before the pumping was started and twice a day during the duration of the pilot study.
- Groundwater samples were obtained:
 - before the air stripper,
 - after the air stripper,
 - after the carbon polisher.

These samples were taken twice a day during system operation and were sent to a fixed base lab for analysis for BTEX and EDB. The analysis methods used for the groundwater analysis included: USEPA Method 8020 for BTEX and USEPA Method 504 for EDB.

3.3 PRODUCT RECOVERY PILOT STUDY RESULTS

The pilot study was operated for seven days, 24 hours a day. Table 3.2 shows the flow rates pumped during each day of the testing.

TABLE 3.2 OPERATING PARAMETERS	
Day	Flow Rate (gpm)
9/16/93	50
9/17/93	50
9/18/93	50
9/19/93	50
9/20/93	System shut down at 8:00 AM due to equipment problems.
9/21/93	Start pumping at 82 gpm at 8:32 AM. Reduced to 66.5 gpm at 4:08 PM.
9/22/93	60

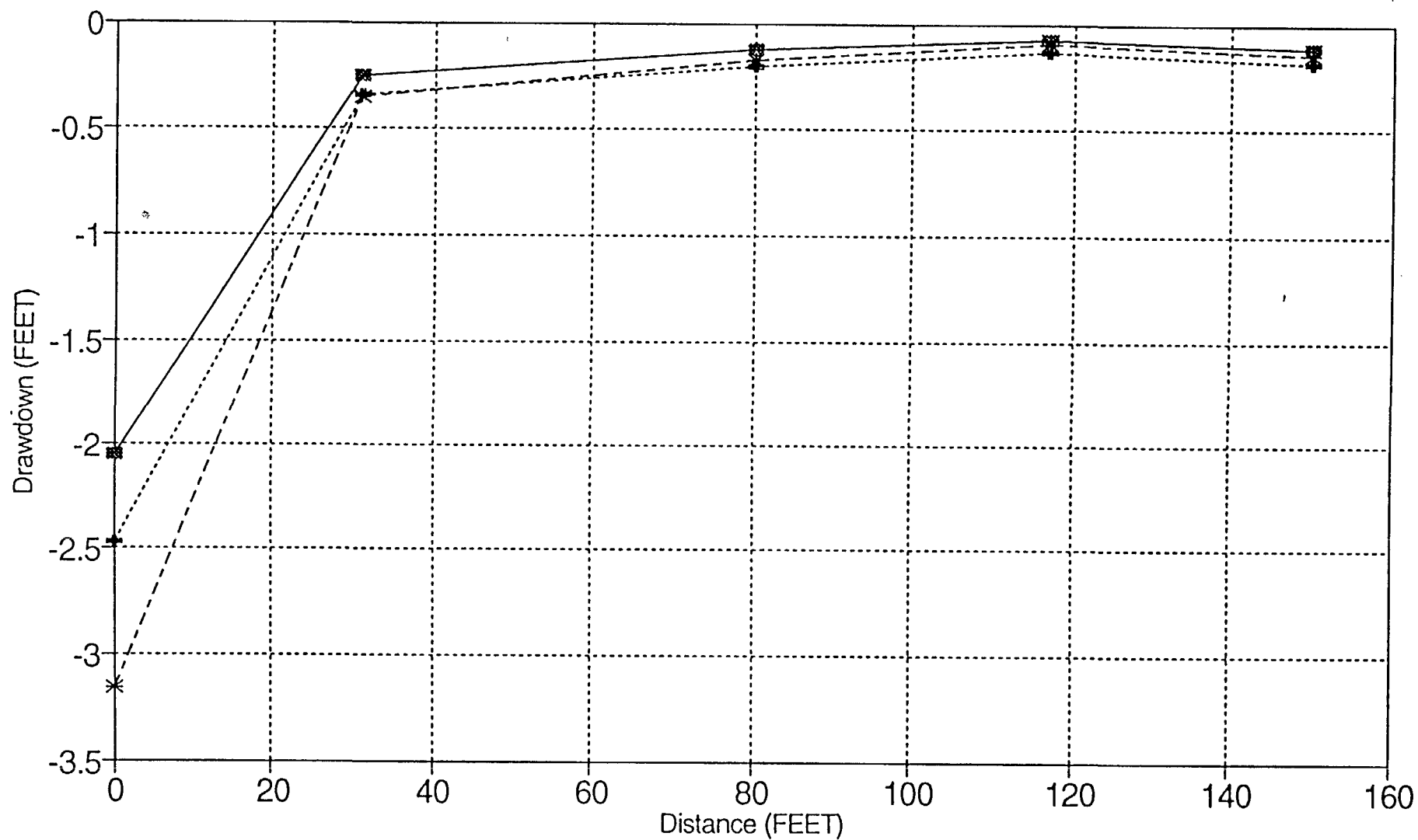
3.3.1 Product Recovery

During the entire pilot study, floating product was not detected in the pumping well. The only product that was measured in any of the wells was 0.66 feet in LWA-1 and a sheen of product on the interface probe from monitoring well WT-13.

3.3.2 Water Level Data

The water level changes were measured with transducers and a datalogger in the product recovery well (PR-1) and four observation wells (OW-1, OW-2, WT-13 WT-17). Figure 3.3 shows the maximum drawdowns for each flow rate. The data collected by the dataloggers and associated plots are included in Appendix E.

Figure 3.3 Maximum Drawdowns
Product Recovery Pilot Study



—■— 50 GPM ...+... 66 GPM -*- 82 GPM

3.3.3 Groundwater Laboratory Analysis

Groundwater samples were collected in three different locations in the treatment system. These locations were before the air stripper, after the air stripper and after the liquid phase carbon unit. Table 3.3 summarizes the results of the laboratory analyses for BTEX and EDB. Ground water samples obtained before the air stripper were analyzed for the constituents shown in Table 3.4. The complete laboratory results are in Appendix F.

TABLE 3.3 GROUNDWATER SAMPLES - BTEX AND EDB LABORATORY RESULTS						
Sample #	Sampling Location	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (ppb)	EDB (ppb)
PR1-B-091593-1	Before Treatment	9.7	11400	1100	4870	BDL
PR1-I-091593-1	After Airstripping	BDL	39.7	3.2	23.7	BDL
PR1-A-091593-1	After Carbon Treatment	BDL	BDL	BDL	BDL	BDL
PR1-B-091693-1	Before Treatment	30.1	9050	775	3600	BDL
PR1-I-091693-1	After Airstripping	BDL	52.8	5.1	31.5	BDL
PR1-A-091693-1	After Carbon Treatment	BDL	BDL	BDL	BDL	BDL
PR1-A-091693-2	After Carbon Treatment	BDL	BDL	BDL	BDL	BDL
PR1-A-091793-1	After Carbon Treatment	BDL	5.4	DBL	2.3	BDL
PR1-B-091893-1	Before Treatment	68	8000	730	3075	BDL
PR1-I-091893-1	After Airstripping	BDL	7308	6.2	43.2	BDL
PR1-A-091893-1	After Carbon Treatment	BDL	BDL	BDL	BDL	BDL
PR1-A-091893-2	After Carbon Treatment	BDL	6.0	BDL	2.6	BDL
PR1-A-091993-1	After Carbon Treatment	BDL	7.2	0.5	3.4	BDL
PR1-A-091993-2	After Carbon Treatment	BDL	9.8	0.6	4.0	BDL
PR1-B-092193-1	Before Treatment	48.7	6100	590	2400	BDL
PR1-I-092193-1	After Airstripping	20.6	3800	265	1300	BDL
PR1-I-092193-2	After Airstripping	29.0	13000	1100	4300	BDL
PR1-B-092293-1	Before Treatment	45.5	10800	1200	4250	BDL
PR1-I-092293-1	After Airstripping	2.5	1800	190	180	BDL
PR1-I-092293-2	After Airstripping	2.9	1400	150	610	BDL
PR1-B-092393-1	Before Treatment	32	10900	1300	4350	BDL
PR1-I-092393-1	After Carbon Treatment	2.7	1300	140	510	BDL

TABLE 3.4 GROUNDWATER SAMPLES - INORGANIC ANALYSIS						
Sample #	pH	Dissolved Oxygen (mg/L)	Dissolved Fe (mg/L)	Dissolved Mn (mg/L)	Total Fe (mg/L)	Total Mn (mg/L)
ASI-INORG-092193-1	5.83	4.40	22	1.46	25	1.51
ASI-INORG-092193-2	5.86	5.72	17	1.26	31	1.45
ASI-INORG-092293-1	5.84	3.80	18	1.17	30	1.43
ASI-INORG-092293-2	5.85	3.20	19	1.24	24	1.39
ASI-INORG-092393-1	5.88	4.63	18	1.24	24	1.23

3.3.4 Operational Problems

The air stripper and the carbon units were effective in removing the BTEX components from the groundwater during most of the pilot study operation. Some operational difficulties were encountered during the operation of the water treatment system and the laboratory results reflect some of these difficulties. The following were the major difficulties encountered:

- The carbon tray filters provided with the air stripper to treat the off-gases experienced breakthrough of volatile compounds after only twelve hours of operation. Additional canisters of carbon had to be purchased and brought to the site to treat the air stripper off-gases.
- The canister carbon filters used to treat the off-gases created higher back pressures on the air stripper than the carbon tray filters did and thus the effectiveness of the air stripper was reduced in removing volatile components at higher groundwater pumping rates .
- The groundwater contained a much higher concentration of iron than was expected. The air stripper provided an unlimited supply of oxygen for the formation of ferrous oxide. The precipitated iron was then filtered out by the carbon units that were used to polish the groundwater prior to discharge. The iron precipitate totally clogged the carbon filters and made them inoperable after four days of operation. The pilot study was continued without this final treatment step because the air stripper was able to remove the BTEX components to below MMCLs.

3.4 PRODUCT RECOVERY PILOT STUDY CONCLUSIONS

The product recovery pilot study was unable to recover any of the free product that was discovered at the site. Although free product is known to exist at the source area, previous investigations and measurements indicate free product is not uniformly distributed through the estimated source area, and the free product thickness measured in various wells vary with seasonal fluctuations in the water table. Based on results of the pilot study and observations of the free product behavior, free product recovery via a dual pumping scheme would not be feasible as part of the remediation of the FS-12 source area.

4.0 SOIL VAPOR EXTRACTION PILOT STUDY

4.1 PILOT STUDY LAYOUT

The soil vapor extraction pilot study was conducted south of Greenway Road in the middle of the suspected free product area as defined during the December 1992 through January 1993 free product investigation. One vapor extraction (PR-1) well was installed to conduct the study. Three observation wells were installed (OW-1, OW-2 and WT-17) as monitoring points. One existing well (WT-13) was also used as a monitoring point. These wells were the same wells that were used for the product recovery pilot study. Figure 3.1 shows the locations of the vapor extraction well and the observation wells. Table 4.1 presents the distances from the vapor extraction well to the observation wells.

Table 4.1	
Observation Well	Distance to Vapor Extraction Well PR-1 (feet)
WT-17	31
WT-13	80
OW-1	117
OW-2	150

4.2 SOIL VAPOR EXTRACTION PILOT STUDY SYSTEM DESCRIPTION

The soil vapor extraction system consisted of the following:

- one vapor extraction well (PR-1) and four observation wells (WT-13, WT-17, OW-1 and OW-2),
- a 280 scfm blower system,
- a diesel powered generator,
- carbon canisters for emissions control,
- pressure transducers and a datalogger.

Figure 4.1 details the soil vapor extraction pilot study system.

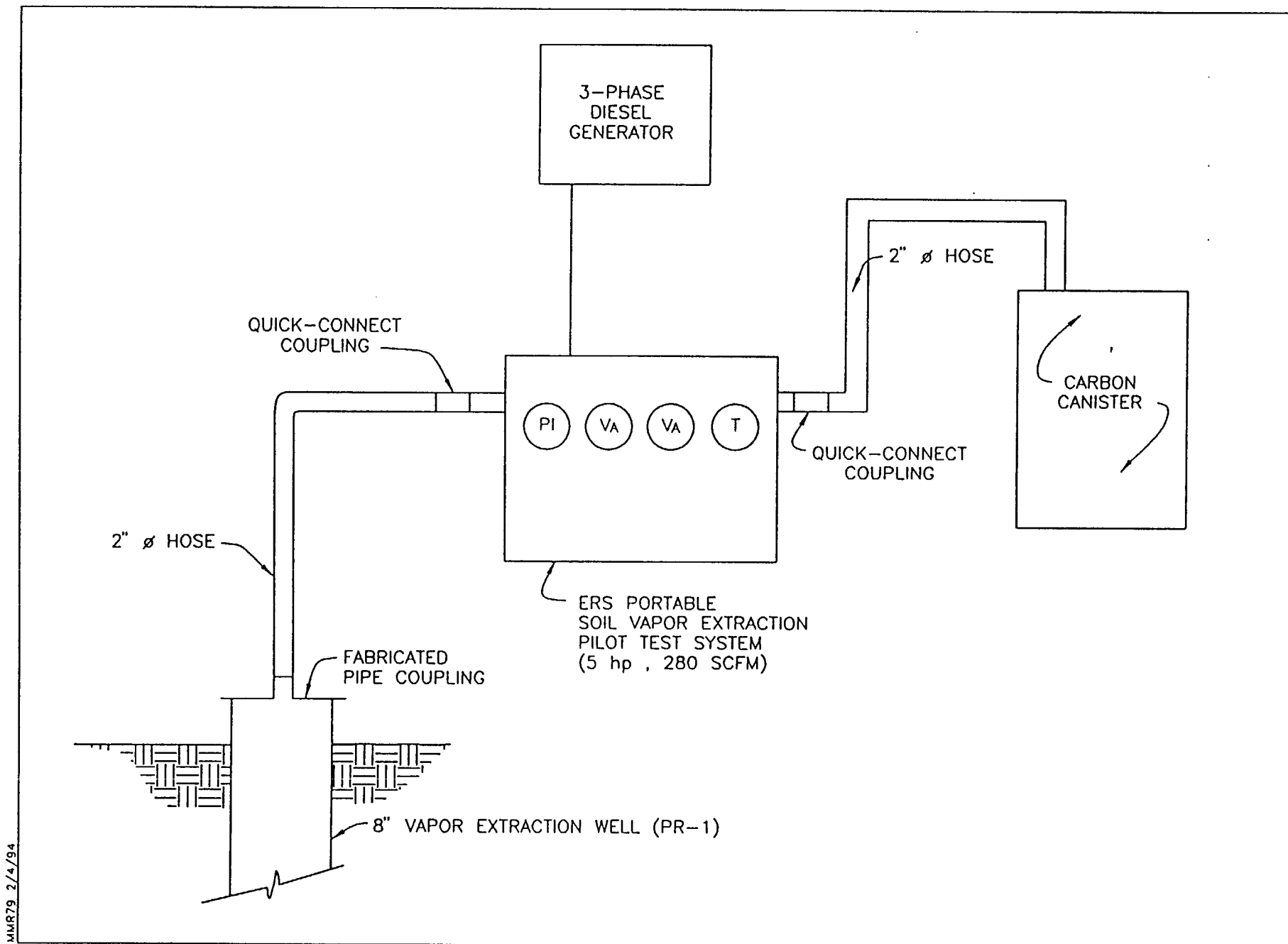


FIGURE 4.1 VAPOR EXTRACTION PILOT STUDY SYSTEM

4.2.1 Soil Vapor Extraction Well and Observation Wells Description

The soil vapor extraction pilot study was conducted in the same wells used for the product recovery pilot. The vapor extraction well (PR-1) was constructed of 8 inch diameter schedule 80 PVC riser with 50 feet of stainless steel screen. The top of the screen was placed 27 feet above the water table. One of the observation wells used for the pilot study was the existing water table well WT-13. The other three observation wells were completed specifically for this study and were constructed of 2 inch diameter schedule 80 PVC risers with twenty feet of stainless steel screen. The top of the screen was placed 10 feet above the water table for each well. The boring logs, well construction logs and well development logs for wells PR-1, WT-17, OW-1 and OW-2 are included in Appendix A. Soil sampling was conducted during the installation of these wells and a summary of the sampling results and the laboratory data is included in Appendix D.

4.2.2 Blower System

The blower system that was used for the pilot study was a Pilot Test System by Environmental Restoration Systems, Inc. This system was a portable, 5 horsepower, 280 scfm system that was specifically designed for pilot studies. The system was mounted on an aluminum frame and features the blower, air filter, NEMA starting switch, all stainless piping, full range of vacuum gauges, discharge pressure gauge, temperature gauge, inlet and discharge air flow sensor gauges, and discharge sampling port.

The blower was connected to the well with a 2 inch diameter vacuum line. The exhaust from the blower was routed through two carbon canisters before being released to the atmosphere.

4.2.3 Diesel Powered Generator

The blower required a source of three phase 230/460 volt power. This power was provided by a portable diesel generator. The generator was sized to provide the power requirements for the blower. An auxiliary fuel tank was leased with the generator so that an additional source of fuel was readily available at the site.

4.2.4 Carbon Canisters for Emission Control

The emissions generated during the pilot study were directed through two vapor-phase carbon canisters connected in parallel before being released to the atmosphere. The canisters were able to reduce the contaminants in the extracted vapors by at least 95%.

4.2.5 System Operation

The soil vapor extraction pilot study was performed to establish the following parameters:

- radius of influence of the vapor extraction well,
- air permeability of the soil,
- soil vapor effluent concentrations
- Oxygen and carbon dioxide levels of the effluent.

The system was operated at 110 scfm, 150 scfm and 180 scfm flow rates during a four day period.

4.2.6 System monitoring and Sampling

The following are the sampling and monitoring activities that were conducted during the soil vapor extraction pilot study system operation:

- Air pressure changes as a result of the vacuum placed on the extraction well were measured in the observation wells and the extraction wells. Pressure transducers and a data logger were used to collect this data.
- Gas samples were taken from the soil gas sampling port and were sent to a fixed base lab for analysis.
- The extracted soil gas was analyzed in the field on a hourly basis for oxygen, carbon dioxide, methane, LEL, and organic vapors.
- The effluent from the carbon canisters was checked on a hourly basis during system operation with either a HNu or an OVM meter to verify that "breakthrough" of the carbon had not occurred.

4.3 SOIL VAPOR EXTRACTION RESULTS

The soil vapor extraction pilot testing system was operated for four consecutive days. The field logs for the soil vapor extraction pilot study are included in Appendix G. The data collected by the data loggers and plots of the logged data are included in Appendix H.

The pilot study was operated with increasing flow rates each day of testing. Table 4.2 below shows the operating parameters for each day of operation.

TABLE 4.2 - OPERATING PARAMETERS				
TEST NO.	DAY	FLOW RATE (SCFM)	VACUUM ON WELLHEAD (IN OF H ₂ O)	LENGTH OF OPERATION (HOURS)
VES-1	9/28/93	100	0.6	3
VES-2	9/29/93	150	1.8	8
VES-3	9/30/93	180	2.9	8
VES-4	10/1/93	180	2.9	5.5

4.3.1 Air Pressure Changes

Each observation well was monitored with a transducer and datalogger to measure air pressure changes in the wells. The results were very conclusive for the two closest wells (WT-17 and WT-13). These wells showed a very positive and sustained response to the vacuum applied to the vapor extraction well. Both OW-1 and OW-2 showed a response early in each test, but the pressure changes were not always sustained for the entire test. Figures 4.2 through 4.5 record the field data for each test. Appendix H contains the data collected by the datalogger during the vapor extraction pilot study.

The results for Test No. VES-1 showed rises in the air pressures during the total test time. The pressures should have dropped during the test and then increased after the blower was shut down. The pressure changes measured in well OW-2 were used as the background air pressure changes that occurred as the barometric pressure changed. The pressure changes recorded in OW-2 were subtracted from the changes measured in the other observation wells. These "corrected" air pressures were plotted for the 100 SCFM test on Figure 4.5. The "corrected" results approximated the results from the other tests. Changes in measured air pressures during the other tests, other than expected changes due to the applied vacuums, can be explained by changes in the barometric pressure, because the changes in each well mirror each other.

Figure 4.7 records the vacuum pressure applied during the testing to well PR-1. In each case, the blower system was able to develop and maintain the vacuum pressure at the well head. The vacuums applied ranged from 0.5 to 2.9 inches of water.

Figure 4.2 Air Pres. Changes 100scfm
Soil Vapor Extraction Pilot Study

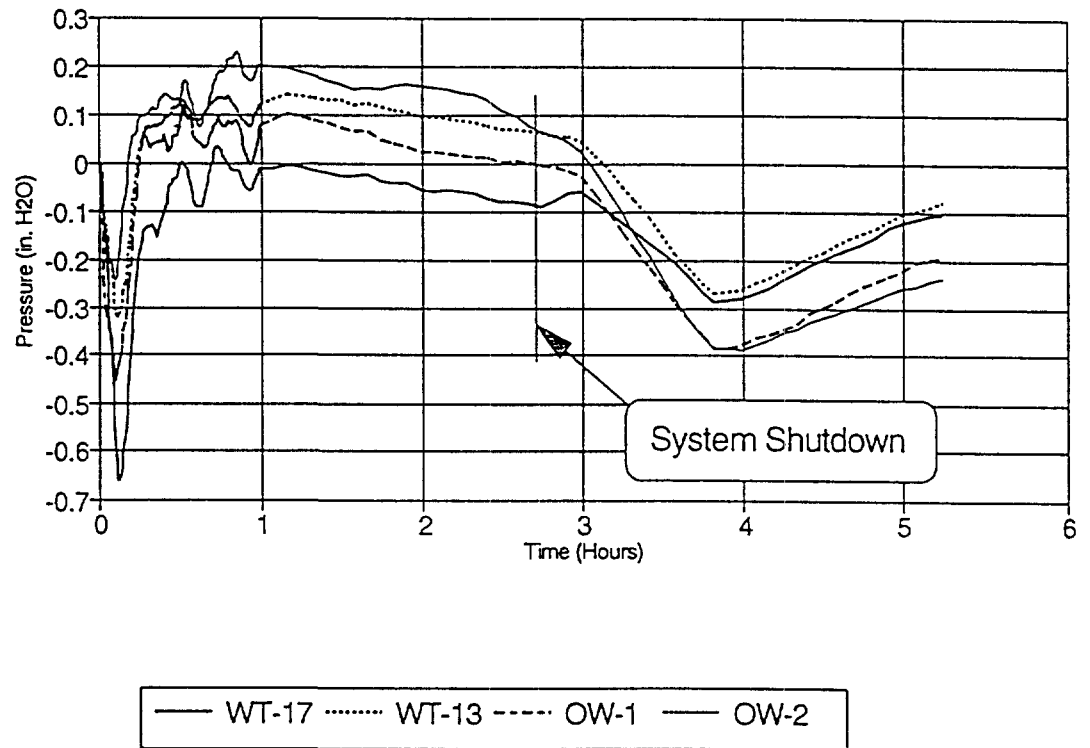


Figure 4.3 Air Pressure Changes 150scfm
Soil Vapor Extraction Pilot Study

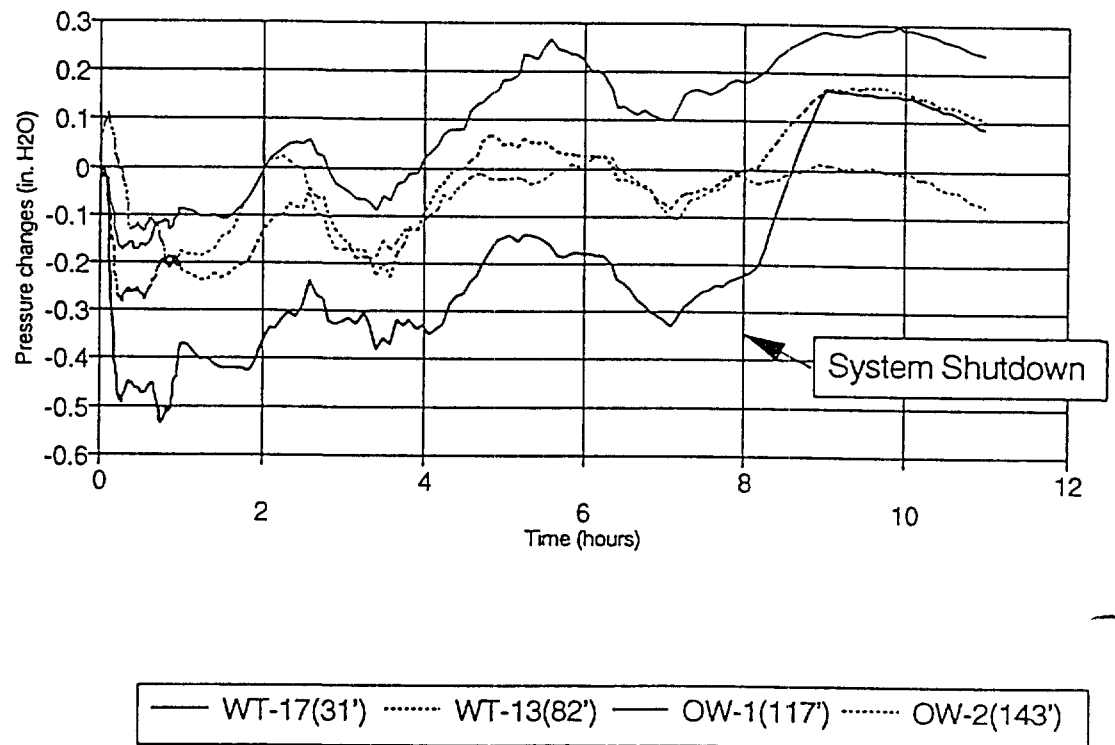


Figure 4.4 Air Pressure Changes 180scfm
Soil Vapor Extraction Pilot Study

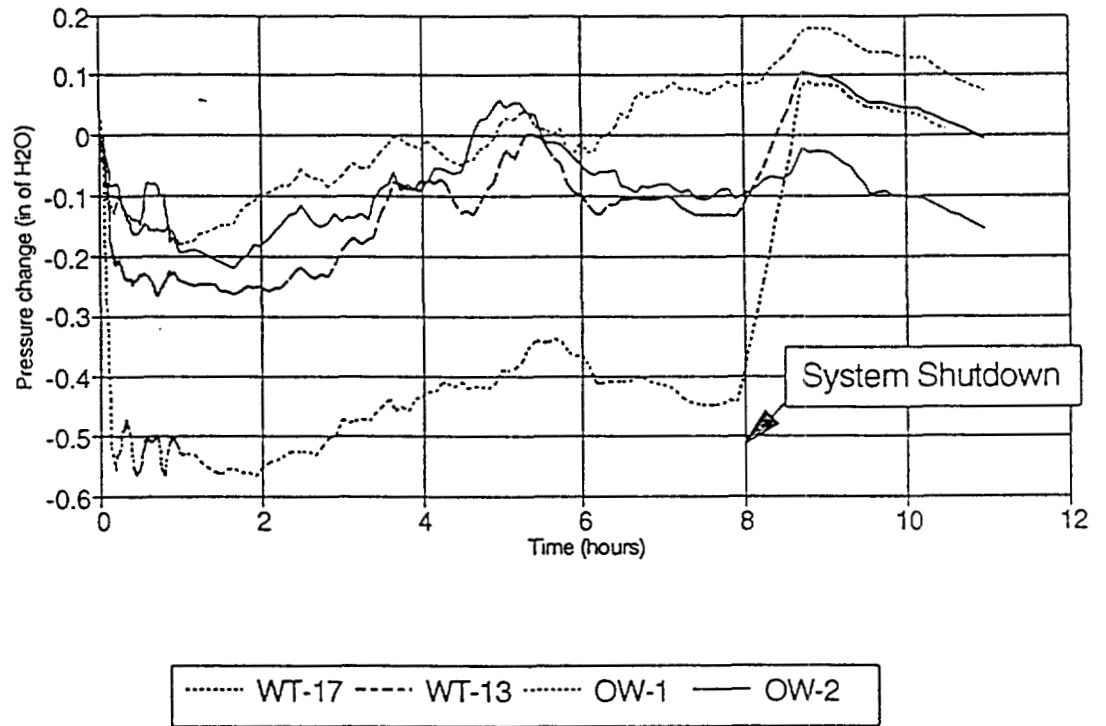


Figure 4.5 Air Pres. Changes 180 SCFM
Soil Vapor Extraction Pilot Study

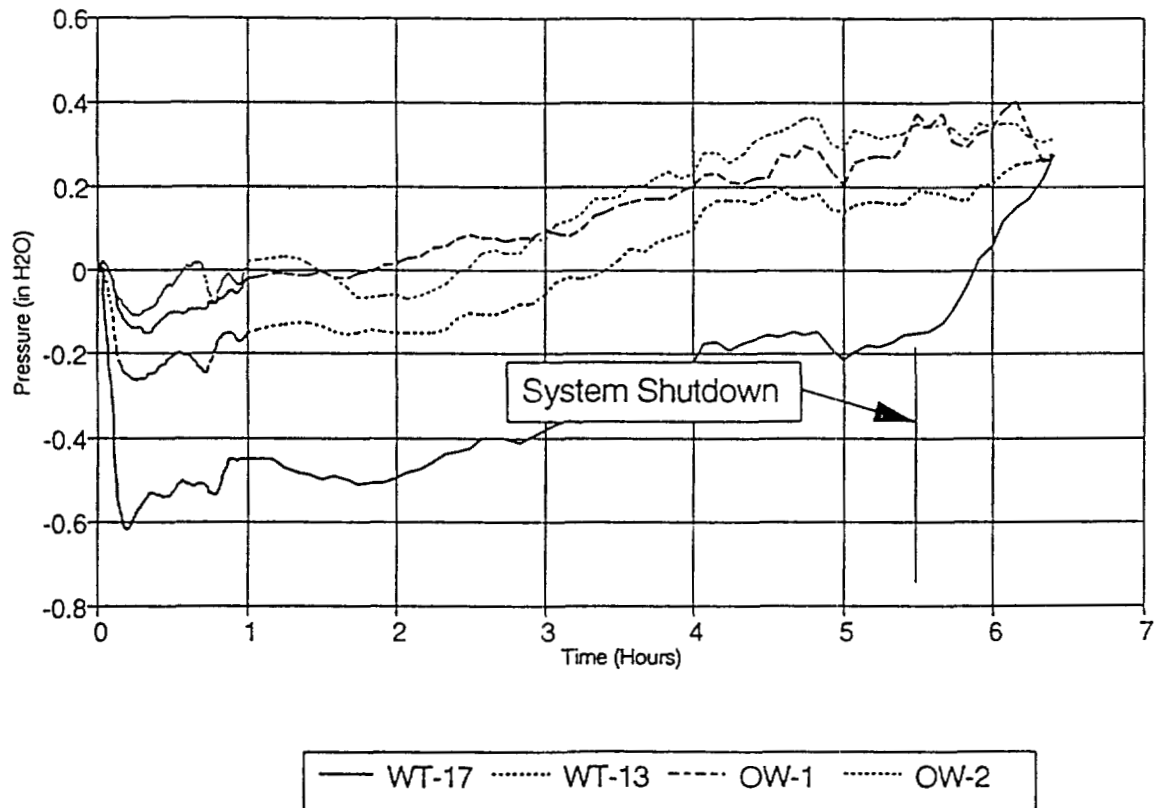


Figure 4.6 Air Pres. Changes 100scfm
SVE (Adj. for Barometric Pressure)

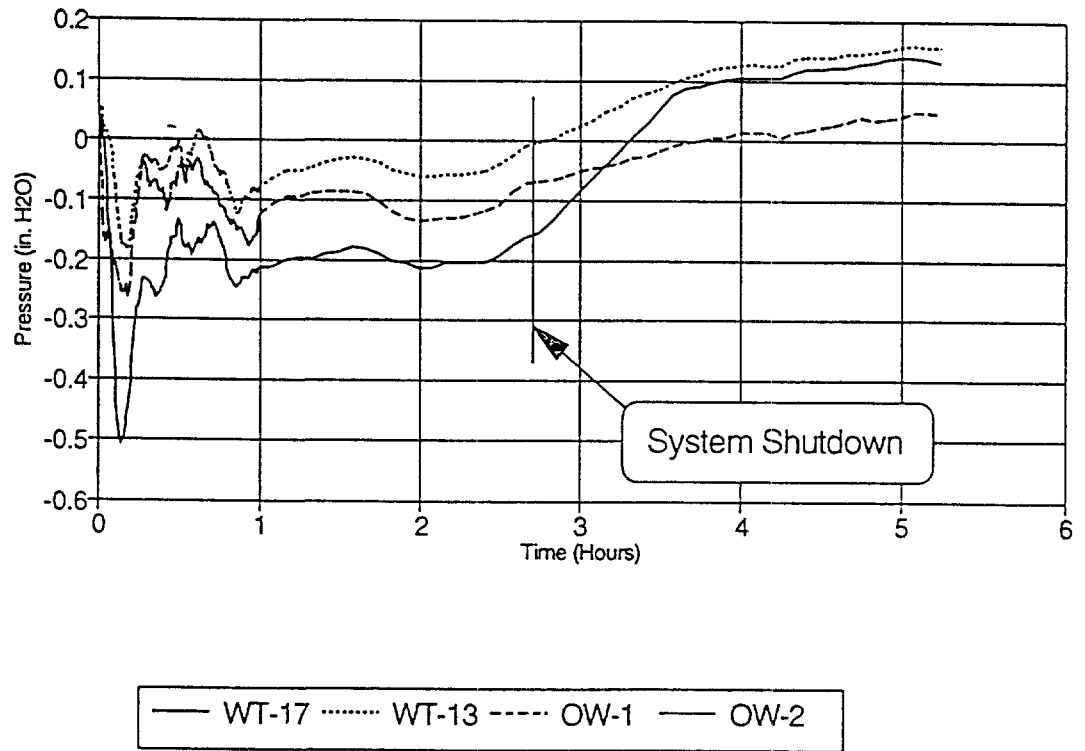
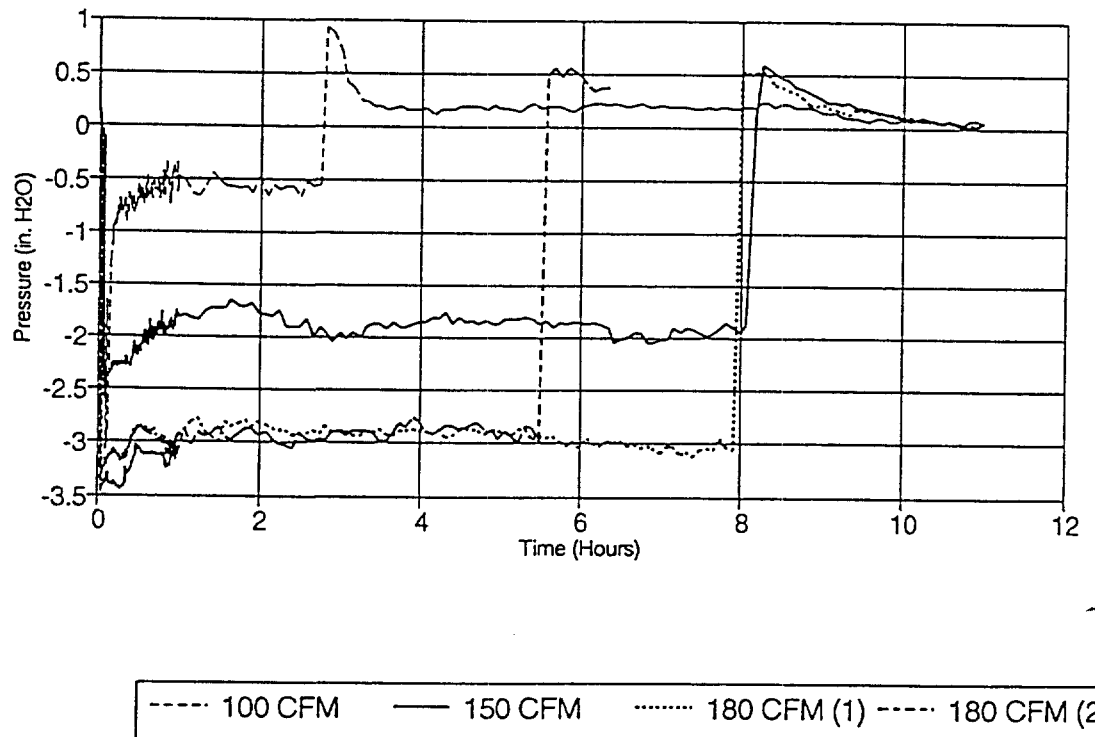


Figure 4.7 PR-1 Vacuums
Soil Vapor Extraction Pilot Study



4.3.2 Soil Gas Laboratory Analysis Results

Soil gas samples were collected in vacuum canisters and sent to a fixed base laboratory for analysis. The results of the laboratory analysis are shown in Appendix I. Table 4.3 summarizes the laboratory results of the twelve soil gas samples.

Table 4.3 Soil Gas Analysis Summary from Soil Vapor Extraction Pilot Study		
Analyte	Minimum	Maximum
Benzene	ND	ND
Toluene	11 ug/L	18 ug/L
Ethylbenzene	0.93 ug/L	2.2 ug/L
Total Xylenes	3.2 ug/L	14 ug/L
EDB	ND	ND
TPH	2200 ug/L	3300 ug/L
C2-C4 Hydrocarbons	ND	62 ug/L
Oxygen	3.8%	7%
Nitrogen	82%	86%
Carbon Monoxide	ND	ND
Methane	ND	ND
Carbon Dioxide	9.0%	12%
Ethane	ND	ND
Propane	ND	ND
Isobutane	ND	ND
Butane	ND	ND
Neopentane	ND	ND
Isopentane	0.008%	0.014%
n-Pentane	ND	0.002%
C6+	0.17%	0.26%
BTU	8.4 BTU/CF	13 BTU/CF

4.3.3 Soil Gas Field Measurements

The extracted soil gas was analyzed in the field on a hourly basis for oxygen, LEL, carbon dioxide, methane, and organic vapors. Table 4.4 provides a summary of these field measured parameters.

Table 4.4 Soil Gas Field Measurements		
Parameter	Minimum Reading	Maximum Reading
Oxygen	3.1%	5.6%
LEL	132%	190%
Carbon Dioxide	8.7%	12%
Methane	6.3%	9.5%
Organic vapors (Before Carbon)	184 ppm	234 ppm
Organic Vapors (After Carbon)	0.0 ppm	13 ppm

The readings showed slight changes as the pilot study continued. Oxygen levels in the soil gas slowly increased with each day of the pilot study. The LEL, carbon dioxide, methane and organic vapor concentrations all showed slight decreases with each day of the pilot study. The consistency of the extracted vapor concentrations detected during the duration of the pilot study indicate that the soil vapor extraction system will be able to remove a significant amount of the existing contamination. The existing high carbon dioxide readings and low oxygen readings would indicate that some biodegradation has been and is currently taking place. The combined air sparging/soil vapor extraction system will be able to provide needed oxygen to the microorganisms so they can make a contribution to the remediation of the site.

4.3.4 Emission Control Effectiveness

The carbon canisters were very effective in reducing the emissions from the soil vapor system. The minimum reduction was 94.4% and the maximum reduction was 100%. Two canisters containing 170 pounds of carbon each were installed in parallel to treat all of the extracted soil gas. Breakthrough of the canisters was observed after approximately twelve hours of operation.

4.4 SOIL VAPOR EXTRACTION PILOT STUDY CONCLUSIONS

The soil gas extraction pilot study was a complete success. The air pressure measurement obtained were conclusive enough to predict the radius of influence of the extraction well. The laboratory analysis results and the field measurements taken during the system operation indicate that the soil vapor extraction technology would work extremely well in the outwash sands and gravel of the study area.

5.0 MICROBIAL TESTING

Soil samples were collected during the installation of three wells (WT-17, OW-1 and OW-2) and sent to Microbial Insights, Inc. The analysis performed by Microbial Insights, Inc. were performed to determine if there was a resident active microbial community at the FS-12 site that could be used to help with the remedial action planned at the site. Two soil samples were taken from each well at depths ranging from 76 to 87 feet below the ground surface. The samples were frozen after collection and shipped directly to the lab packed in dry ice.

The purpose of the testing was to assess the health of the microbial community. The results would indicate that the samples from well WT-17 were very healthy and a increase in the available oxygen would greatly increase their growth rate. The results from the samples from OW-1 would indicate that the population in that well is under environmental stress from a toxic environment. The results from OW-2 would indicate that there is little biomass at that location. These results match very closely with the expected results based on the extent of the contamination. OW-1 is closest to the original spill and would have the most toxic environment for the microbial community to survive in. WT-17 is still in the contaminated zone but not as heavily contaminated as the OW-1, therefore there would be a abundance of hydrocarbons for the microbes to use as a substrate, but not enough to be toxic to them. OW-2 is on the fringes of the contamination and the levels of hydrocarbons would not be enough to encourage microbe growth.

The complete report from Microbial Insights, Inc is contained in Appendix J.

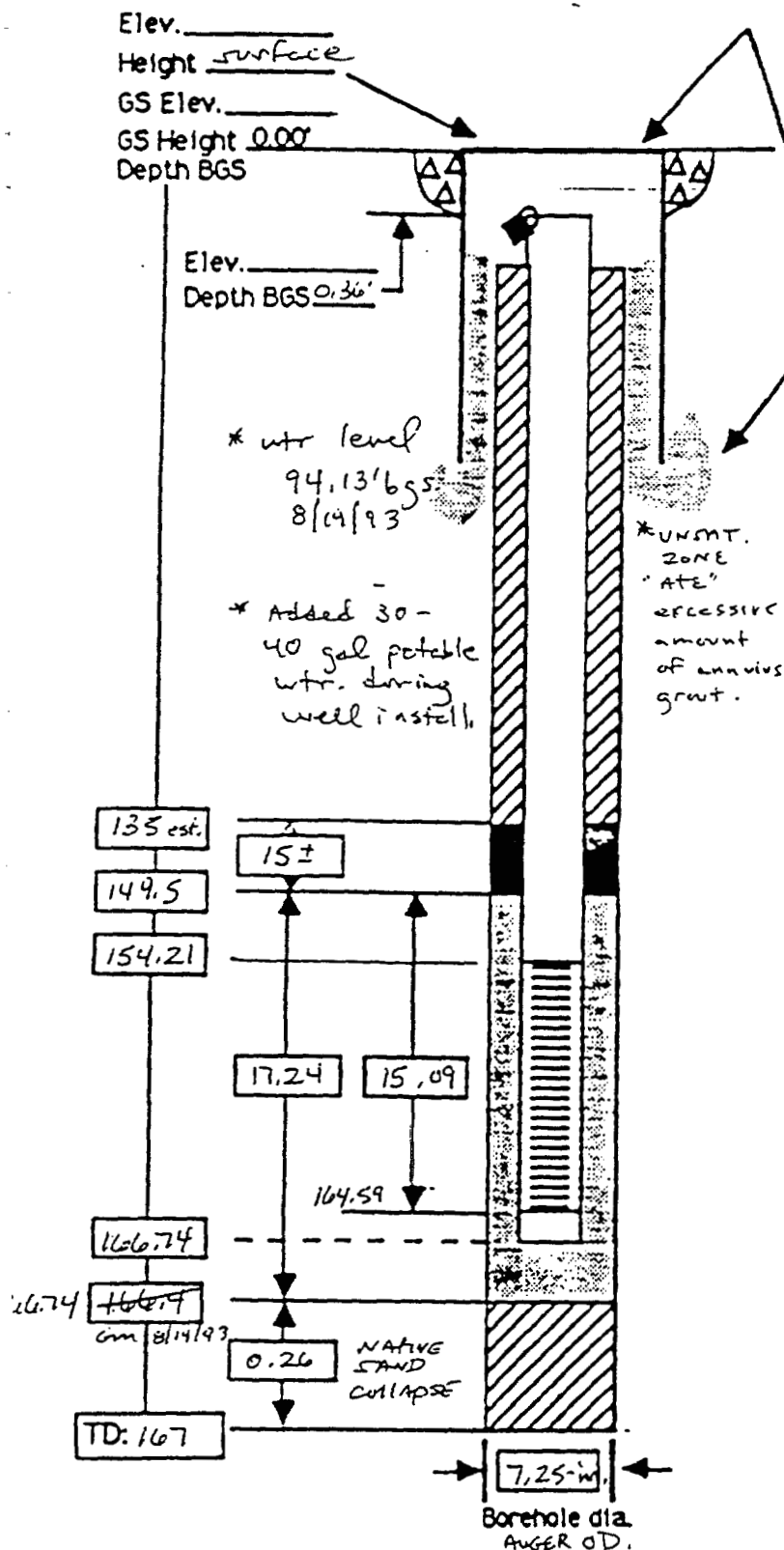
APPENDIX A
BORING LOGS
MONITORING WELL CONSTRUCTION LOGS
WELL DEVELOPMENT LOGS

BORING LOG	BORING/WELL NO.: AS-1	Page <u>1</u> of <u>1</u>
Installation: M.M.I.Z.	Project No.: 750-KOV.3.05	Client/Project: HAZWRAP/M.M.I.Z.
HAZWRAP Contractor: ASI	Drill Contractor:	Driller: Dan Gotte
Drill Started: 8/17/93 (14:10 PM)	Drill Ended: 8/17/93 (16:20 PM)	Borehole dia(s): 7.25+ inches
Drill Method/RIG Type: CME-75 Hollow Stem Augers (4.25-inch ID)		
Logged by: GM, MM	E-Log (Y/N) From _____ to _____	Protection Level: D

Depth (ft)	Sample No.	Lab Anal. (Y/N)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch.	Graphic Log	Well data	Water depth & Remarks	Elev.
0				* No split-spans. cuttings only,						
10				0-30' (?) Sand and Gravel, est.	tu					
20				① lt. brn, well graded sand w/ some silt, well	-?					
30				graded gravel						
40				(pea-cobble/boulder size), trace moisture, loose. (SW).	\$P					
50										
60				30(?) - 167' (TD) Sand, lt. brown, dominantly medium grained, w/ well graded gravel						
70				(minor (5-15%))						
80				moist - tr. moisture, loose. (SP)						
90				TD ~ 167'					* wtr level 94.13' bgs 8/19/93	
100										
110										
120				* Added 30-40 gallons of potable wtr to clear blockage in lead auger at TD.						
130										
140										
150										
160				TD 167' bgs						
170				① lt. brn = Grayish orange 10 YR 7/4 to Mod. Yellowish Brn 10 YR 5/4 (Munsell)						

U = Thin Wall Tube R = Rock Coring Field G/C (Make/Mod.)
 S = Split spoon (tube) O = Other G/C Oper.:
 C = Cuttings Notes:

MONITORING WELL CONSTRUCTION LOG -- Standard Flush Mount		
WELL NO.: AS-1	Installation: MMR	Site: AS-1
Project No.: 9750-K04.3	Client/Project: HAZWRAP / MMR	
HAZWRAP Contractor: ASI	Drig Contractor: BEI	
Comp. Start: 8/17/93 (16:40 2m)	Comp. End: 8/19/93 (15:10 2m)	
Built By: BEI (D. Gatto), ASI (Gm, mm)		Well Coord: .



PROTECTIVE CSG

Material / Type metal "box" 1.5 ft length
Diameter 0.75 ft
Depth BGS ~1.5 ft
Watertight O-Ring (Y/N) bolted lid.

SURFACE PAD

Composition & Size cement 2x2 ft x 4 in.
Breathes With Vadose Zone (Y/N)

RISER PIPE

Type schedule 80 PVC (Bedrock)
Diameter 2 inch
Total Length (TOC to TOS) surface to 154.21
Ventilated Cap (Y/N)

GROUT surface to 135' est. 8/19/93

Composition & Proportions 290 lbs cement 20 SKS Portland Type I/II cement (94 lbs/SK)
Tremied (Y/N) 5 bags powdered Bentonite (Swiss SK) 410 gal wtr.
Interval BGS surface to ~135' estimated 8/19/93

CENTRALIZERS (Y/N)

Depux(s) N/A * Native sand collapse ~94-135 below W.T.

SEAL

~135'-149.5' 1.8 SKS (50 lbs/SK)
Type Bentonite slurry (90 lbs. powder/60 gal wtr.)
Source "Pure Gold" (BEI)
Setup/Hydration time N/A Vol. Fluid Added 40 gal slurry
Tremied (Y/N)

FILTER PACK

166.4-149.5'
Type marie #1 mesh silica
Amt. Used 3 sacks (100 lbs/SK)
Tremied (Y/N)
Source Marie Silica (BEI)
Gr. Size Dist. med-coarse

SCREEN

Type stainless steel (Johnson)
Diameter 2-inch
Slot Size & Type 0.01 slot continuous
Interval BGS 154.21-164.59

SUMP (Y/N)

164.59-166.74 Length 2.15'
Bottom Cap (Y/N) N/A
welded upside down to sump

BACKFILL PLUG

Material native sand collapse
Setup/Hydration time N/A
Tremied (Y/N)

GKm



ADVANCED SCIENCES, INC.

Fieldlog: MMR Book #32

WELL DEVELOPMENT LOG	WELL NO: AS-1
Installation: MMR	Site: Greenway Rd.
Project No. 9750.K04.3.09	
Dev. Start: 8/22/93 1231	Dev. End: 8/22/93 1328 455
Developed by: C. Thiel ^{on 8/22/93} (BET)	G. Manner (AS) ^{on 8/22/93}
	Csq Dia: 2-inch
	Dev. Rig (Y/N)

Dev. Method: 2-inch electric submersible pump (Grundfos) w/ ~ 1/2 inch polyethylene tubing. Purge 3-5 well volumes until sediment free and measured parameters are within 10% on 3 consecutive readings. Lower/purge over 3-5' sections of screen.

Equipment: see Dev. method

$$TD \rightarrow 166.74 - 94.24' (SWL) = 72.5' \text{ wtr. col} \times 0.16 \text{ gal/ft} = 11.6 \text{ gal/vol.}$$

Pre-Dev. SWL: 94.24' bgs Minimum purge = $3 \times 11.6 + (40 \text{ gal drilling wtr}) = 74.8 \text{ gal}$

Range and Average Discharge rate: ~ 1.5 gal/min to ~ 1.75 gal/min + 2.5 gal/min.

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: 89 gal

Disposition of discharge water: tint to clear

1231 Start pump - set ~ 100' bgs.

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
1238	~12	N/A	yes	lt. brn.	13.8	7.16	119	
1241	stopped pump							
1245	restart pump							
1251	~24	N/A	yes	lt. brn.	13.3	6.87	75	
1259	~36	N/A	faint	tint	13.4	6.64	62	
1307	~49	N/A	NO	tr. tint/clear	13.2	6.57	56	
1310	move pump							
1315	~61	N/A	sl.	H. brn.	13.1	6.44	51	
1320	~73	N/A	none	tr. tint/clear	13.4	6.38	30	
1321	move pump wtr browned.							
1326	~85	N/A	NO	tint	13.8	6.41	50	
1328	~89	N/A	NO	tint/clear				

GKM
FMONWEL

BORING LOG	BORING/WELL NO.: OW-1	Page 1 of 2
Installation: MMR/CGN	Site: OW-1 Greenway Rd	
Project No.: 775C.004.3.05	Client/Project: HAZWRAP/MMR	
HAZWRAP Contractor: ASI	Drill Contractor: BEI	Driller: MARK STRZELECKI Dan Gatto
Drill Started: 8/11/93 (12:24 PM)	Drill Ended: 8/14/93 (3:15 PM)	Borehole dia(s): 7.25-inch
Drill Method/Rig Type: CME-75 Hollow Stem Augers (4.25-inch ID)		
Logged by: GM, MM	E-Log (Y/N) From _____ to _____	Protection Level: D

* Depth (ft)	Sample No.	Sample Lab	Anal. (Y/N)	Recovery (ft)	Lithologic Description	USCS	Blows / 6 inch	Graphic Log	Well data	Water depth	Remarks
15				00	# 0-75' No split-spans, cuttings only.						
30				21	Sand and Gravel, lt. brn - tan,	\$P	N/A				
45				24	dominantly medium grained sand,						
60				49	with 10-20% well graded gravel,						
75				63	gravel abundant 0-30 ft, fine						
				63	grained sand/silt present 0-5 ft, loose,						
					tr. moisture.						
				6	Sand, lt. brown, dom. med. grn,	\$P	N/A				
				1.1	poorly graded, loose, no gravel,						
					tr. moisture						
	SOIL	03-1-		32	As above, with some fine to	\$P	N/A				BTEX, TPH, TCC, BACT.
		03-1-		0.7	medium size gravel clasts at base						
		77-081493			of sample						
80				96	As above.	\$P	N/A				
				1.5							
				56	As Above.	\$P	N/A				
				0.9							
				191	As Above, no gravel.	\$P	N/A				
				1.2							
85				272	As Above, no gravel.	\$P	N/A				BTEX, TPH, TCC, BACT.
	SOIL	03-1-		1.7							
		03-1-									
		87-081493									
				91	As Above, no gravel.	\$P	N/A				
				2							
90				282	As Above, no gravel	\$P	N/A				
				1.3							
				16	As Above, no gravel	\$P	N/A				
				1.3							
				2							
	SOIL	03-1-		2	Sand, lt. brown, dom. med. grn,	\$P	N/A				BTEX, TPH, TCC, BACT.
		03-1-			loose, wet, Free product odor						
		77-081493									
95				260	Sand, lt. brown, med. to coarse	\$P	N/A				BASED ON
	SOIL	03-1-		2	grained, with minor gravel,						wtr levels
		03-1-			loose, wet, odor						GMW-51,
		87-081493									WT-13.
											*product
											odor and
											sheen on
100				235	Sand, lt. brn., med. to coarse	\$P	N/A				outside of
	SOIL	03-1-		1.5	grn., w/ trace gtz. pebbles,						split spans
		03-1-			minor gravel						
		87-081493									
105											

U = Thin Wall Tube
 S = Split spoon (tube)
 C = Cuttings

R = Rock Coring

O = Other

Notes:

Field G/C (Make/Mod.)

G/C Oper.:

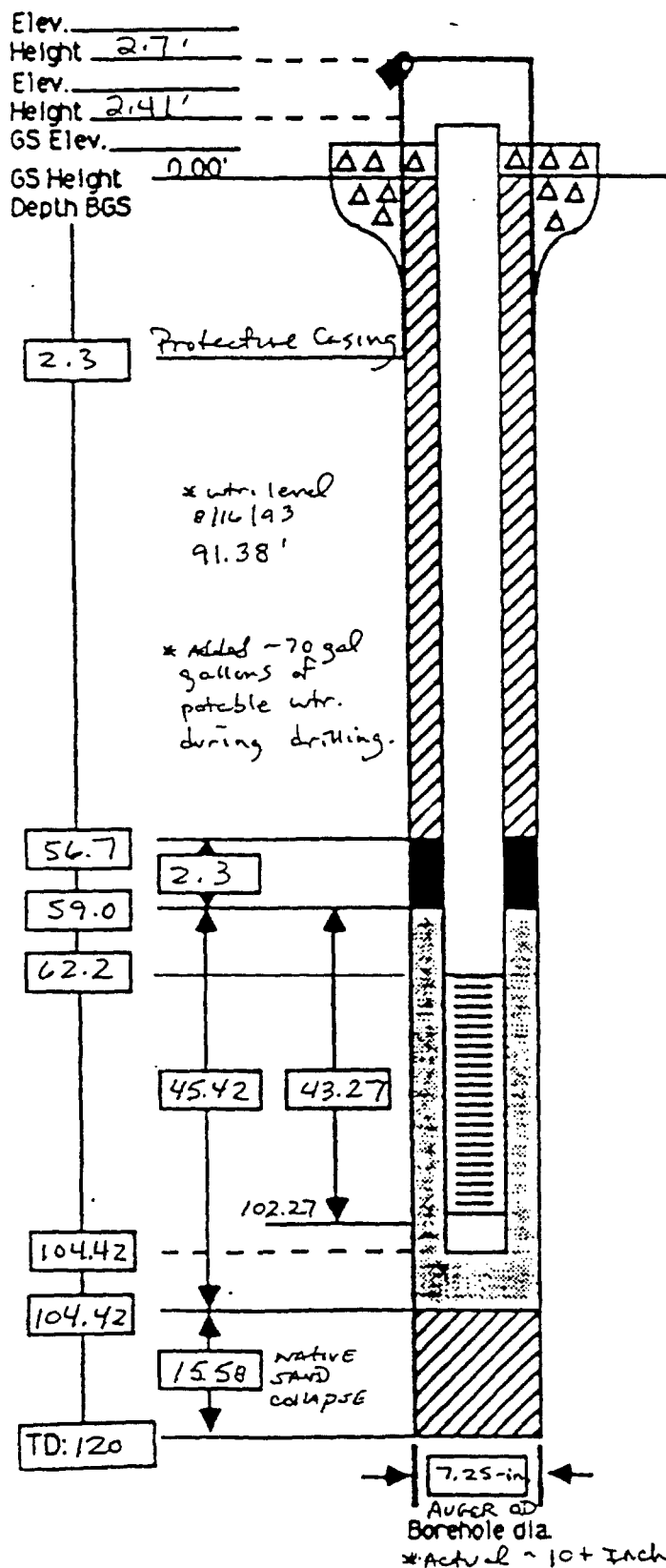
BORING LOG		BORING/WELL NO.: OW-1		Page 2 of 2	
Installation: MMR/CGN			Site: OW-1 Greenway Rd		
Project No.: 9750.0043.09		Client/Project: HAZWRAP / MMR			
HAZWRAP Contractor: ASI		Drill Contractor: BEI		Driller: Dan Gotto	
Drill Started: 8/11/93 (12:24 P.M.)		Drill Ended: 8/14/93 (13:15 P.M.)		Borehole dia(s): 7.25-inch	
Drill Method/Rig Type: CME-75 Hollow Stem Augers (4.25-inch ID)					
Logged by: GM, MM		E-Log (Y/N) From _____ to _____		Protection Level: D	

Depth (ft)	Sample No.	Lab Anal. (Y/N)	Recovery (ft)	Lithologic Description	USCS	Blows/6 inch.	Graphic Log	Well data	Water depth	Remarks	Elev.
105	SP1-1 924-1-108 112-08/193	Y	84	17	Sand, lt. brn., dom. med. grn., w/ some fine grn., trace gravel, loose, wet.	\$P	N/A			GRAIN SIZE	
110	SP1-1 924-1-108 112-08/193	Y	41	19	Sand, lt. brown, dom. med. grn., loose, wet, tr. gravel (8tz.).	\$P				GRAIN SIZE	
115	SP1-1 924-1-108 112-08/193	Y	120	19	Sand, lt. brown, medium/fine grn. sand coarsening downward to dom. coarse sand and gravel, loose, wet.	\$P	N/A			GRAIN SIZE	
120	SP1-1 924-1-108 112-08/193	Y	10	19	Sand, lt. brown, dom. med. grn., loose, wet.	\$P	N/A			GRAIN SIZE	
					AUGER TD 120 FT * lt. brn-tan color equates to mix btw. Grayish Orange 10YR 7/4 and Mod. Yellowish Brn. (pale) 10YR 5/4 (Munsell color chart). * Added 60-70 gallons of potable wtr. during drilling.						

U = Thin Wall Tube	R = Rock Coring	Field G/C (Make/Mod.):
S = Split spoon (tube) 2x24-inch	O = Other	G/C Oper.:
C = Cuttings	Notes:	

MONITORING WELL CONSTRUCTION LOG -- Standard

WELL NO.: OW-1	Installation: MMR/CGN	Site: OW-1
Project No.: 9750-K04/34	Client/Project: HAZWRAP/MMR	
HAZWRAP Contractor: ASI	Drig Contractor: BEI	
Comp. Start: 8/15/93 (11:00 AM)	Comp. End: 8/16/93 (08:00 AM)	
Built By: BEI (Don Gotto), ASI (G.M.M.)	Well Coord: .	



PROTECTIVE CSG

Material / Type 5-ft length carbon steel
Diameter 0.6 ft

Depth BGS 2.3' Weep Hole (Y/N)

GUARD POSTS (Y/N)

No. 4 Type Tubular carbon steel (0.3' Filled w/ cement)

SURFACE PAD

Composition & Size cement 2 ft x 2 ft x 4+ inches

RISER PIPE

Type Schedule 80 PVC (Bedrock Thru)

Diameter 2-inch

Total Length (TOC to JOS) surface to

Ventilated Cap (Y/N)

GROUT cement/Bentonite

Composition & Proportions 12 (94 lb) SKS Type I/II Portland Cement / 2.25 (50 lb) SKS Bentonite

Tremied (Y/N) Powder w/ ~170 gal. pot. wtr.

Interval BGS surface to 56.7'

CENTRALIZERS (Y/N)

Depths) N/A

SEAL

Type Bentonite Pellets 4-inch 1.5 SKTS

Source BARD/D/PATONITE (BEI) (5.1+ gal.)

Setup/Hydration time 1+ hr. Vol. Fluid Added 5 gal.

Tremied (Y/N) potable

FILTER PACK

Type MORIE #1 Mesh

Amt. Used 15 SKS. (100 lb/SK)

Tremied (Y/N)

Source MORIE Silica (BEI)

Gr. Size Dist. med-coarse

SCREEN

Type stainless steel (Johnson Thread)

Diameter 2-inch

Slot Size & Type 0.01 slot continuous

Interval BGS 62.2 - 102.27

SUMP

(Y/N) 102.27-104.42 Length 2.15

Interval BGS

Bottom Cap (Y/N) N/A

Welded upside down on sump

BACKFILL PLUG

Material NATIVE SAND CAVE-IN

Setup/Hydration time N/A

Tremied (Y/N)



ADVANCED SCIENCES, INC.

Fieldlog: MMR Book # 32

WELL DEVELOPMENT LOG		WELL NO: OW-1
Installation: MMR		Site: GREENWAY Rd.
Project No. 9750, K04.3.09		
Dev. Start: 8/22/93	Dev. End: 8/22/93	Csq Dia: 2-inch
Developed by: BEI (CT), ASI (GM)		Dev. Rig (Y (N))

Dev. Method: 2-inch electric submersible pump (Grundfos) w/ 1/2-inch polyethylene tubing. Purge 3-5 well volumes & until sediment free and measured parameters are within 10% on 3 consecutive readings. Lower/purge over 3-5' sections of screen.

Equipment: see above.

$$TD(bgs) 104.42 ft - 91.22 ft = 13.2 ft \times 0.16 \frac{gal}{ft} = 2.1 gal/volume$$

Pre-Dev. SWL: 91.22' bgs Minimum purge = $3(2.1 gal) + 70 gal$ (added during drilling/install) Maximum drawdown during pumping: N/A ft at N/A gpm

Range and Average Discharge rate: 2 gal/min gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: ~85 gal

Disposition of discharge water: v. clear

1705 begin purge - pump at ~96-97' bgs. pump rate ~2 gal/min
1726 Lowered pump to ~100-101' bgs. pump rate ~2 gal/min.

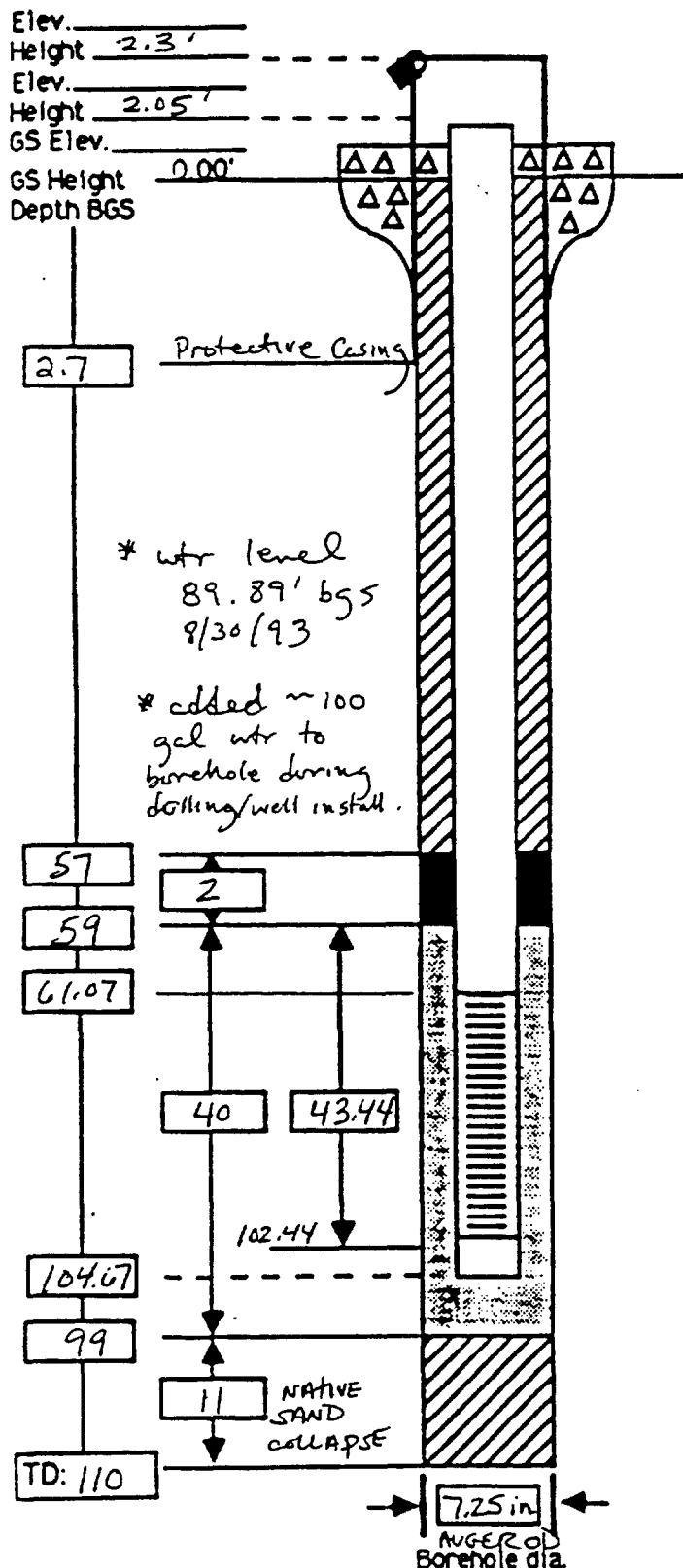
Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
1752	~73	N/A	NONE	v. clear	14.4	6.25	287	* HIGH conductivity
1755	~78	N/A	NONE	v. clear	13.8	6.16	279	x " "
1758	~84	N/A	NONE	v. clear	13.5	6.13	279	x " "
1759	Stopped purge ~85 gal purged							

GM
FMONWEL3

BORING LOG		BORING/WELL NO.: 00-2		Page 1 of 1	
Installation MMR		Project No.: 9750-K04309		Client/Project: HAZWARP/MWR	
HAZWARP Contractor: HSI		Drill Contractor: BEI		Driller: A. Bouteille	
Drill Started: 8/28/93 (15:51 P.M.)		Drill Ended: 8/29/93 (10:16 A.M.)		Borehole dia(s): 7.25-inch	
Drill Method/Rig Type: CME-95 w/ 4.25-inch HRTS (CID)		E-Log (Y/N) From		Protection Level: 1	
Logged by: G. Maynor					

Depth (ft)	Sample No.	Lab No.	Y/N	Recovery (ft)	Notes
0-70'	0	0	N	0	No samples, cuttings only.
70'	116	116	15	116	Sand, 1 ft. brn. dom. med. grn. w/ minor well graded gravel (5-15%); (C&P). 5-15/91/13/13
75'	126	126	14	126	AS Above
80'	171	171	10	171	AS, Above, same gray of top of sample
85'	181	181	15	181	AS, Above, moist
90'	191	191	15	191	AS, Above, moist
95'	201	201	15	201	AS, Above, moist
100'	211	211	15	211	AS, Above, moist
105'	221	221	15	221	AS, Above, moist
110'	231	231	15	231	AS, Above, moist
115'	241	241	15	241	AS, Above, moist
120'	251	251	15	251	AS, Above, moist
125'	261	261	15	261	AS, Above, moist
130'	271	271	15	271	AS, Above, moist
135'	281	281	15	281	AS, Above, moist
140'	291	291	15	291	AS, Above, moist
145'	301	301	15	301	AS, Above, moist
150'	311	311	15	311	AS, Above, moist
155'	321	321	15	321	AS, Above, moist
160'	331	331	15	331	AS, Above, moist
165'	341	341	15	341	AS, Above, moist
170'	351	351	15	351	AS, Above, moist
175'	361	361	15	361	AS, Above, moist
180'	371	371	15	371	AS, Above, moist
185'	381	381	15	381	AS, Above, moist
190'	391	391	15	391	AS, Above, moist
195'	401	401	15	401	AS, Above, moist
200'	411	411	15	411	AS, Above, moist
205'	421	421	15	421	AS, Above, moist
210'	431	431	15	431	AS, Above, moist
215'	441	441	15	441	AS, Above, moist
220'	451	451	15	451	AS, Above, moist
225'	461	461	15	461	AS, Above, moist
230'	471	471	15	471	AS, Above, moist
235'	481	481	15	481	AS, Above, moist
240'	491	491	15	491	AS, Above, moist
245'	501	501	15	501	AS, Above, moist
250'	511	511	15	511	AS, Above, moist
255'	521	521	15	521	AS, Above, moist
260'	531	531	15	531	AS, Above, moist
265'	541	541	15	541	AS, Above, moist
270'	551	551	15	551	AS, Above, moist
275'	561	561	15	561	AS, Above, moist
280'	571	571	15	571	AS, Above, moist
285'	581	581	15	581	AS, Above, moist
290'	591	591	15	591	AS, Above, moist
295'	601	601	15	601	AS, Above, moist
300'	611	611	15	611	AS, Above, moist
305'	621	621	15	621	AS, Above, moist
310'	631	631	15	631	AS, Above, moist
315'	641	641	15	641	AS, Above, moist
320'	651	651	15	651	AS, Above, moist
325'	661	661	15	661	AS, Above, moist
330'	671	671	15	671	AS, Above, moist
335'	681	681	15	681	AS, Above, moist
340'	691	691	15	691	AS, Above, moist
345'	701	701	15	701	AS, Above, moist
350'	711	711	15	711	AS, Above, moist
355'	721	721	15	721	AS, Above, moist
360'	731	731	15	731	AS, Above, moist
365'	741	741	15	741	AS, Above, moist
370'	751	751	15	751	AS, Above, moist
375'	761	761	15	761	AS, Above, moist
380'	771	771	15	771	AS, Above, moist
385'	781	781	15	781	AS, Above, moist
390'	791	791	15	791	AS, Above, moist
395'	801	801	15	801	AS, Above, moist
400'	811	811	15	811	AS, Above, moist
405'	821	821	15	821	AS, Above, moist
410'	831	831	15	831	AS, Above, moist
415'	841	841	15	841	AS, Above, moist
420'	851	851	15	851	AS, Above, moist
425'	861	861	15	861	AS, Above, moist
430'	871	871	15	871	AS, Above, moist
435'	881	881	15	881	AS, Above, moist
440'	891	891	15	891	AS, Above, moist
445'	901	901	15	901	AS, Above, moist
450'	911	911	15	911	AS, Above, moist
455'	921	921	15	921	AS, Above, moist
460'	931	931	15	931	AS, Above, moist
465'	941	941	15	941	AS, Above, moist
470'	951	951	15	951	AS, Above, moist
475'	961	961	15	961	AS, Above, moist
480'	971	971	15	971	AS, Above, moist
485'	981	981	15	981	AS, Above, moist
490'	991	991	15	991	AS, Above, moist
495'	1001	1001	15	1001	AS, Above, moist
500'	1011	1011	15	1011	AS, Above, moist
505'	1021	1021	15	1021	AS, Above, moist
510'	1031	1031	15	1031	AS, Above, moist
515'	1041	1041	15	1041	AS, Above, moist
520'	1051	1051	15	1051	AS, Above, moist
525'	1061	1061	15	1061	AS, Above, moist
530'	1071	1071	15	1071	AS, Above, moist
535'	1081	1081	15	1081	AS, Above, moist
540'	1091	1091	15	1091	AS, Above, moist
545'	1101	1101	15	1101	AS, Above, moist
550'	1111	1111	15	1111	AS, Above, moist
555'	1121	1121	15	1121	AS, Above, moist
560'	1131	1131	15	1131	AS, Above, moist
565'	1141	1141	15	1141	AS, Above, moist
570'	1151	1151	15	1151	AS, Above, moist
575'	1161	1161	15	1161	AS, Above, moist
580'	1171	1171	15	1171	AS, Above, moist
585'	1181	1181	15	1181	AS, Above, moist
590'	1191	1191	15	1191	AS, Above, moist
595'	1201	1201	15	1201	AS, Above, moist
600'	1211	1211	15	1211	AS, Above, moist
605'	1221	1221	15	1221	AS, Above, moist
610'	1231	1231	15	1231	AS, Above, moist
615'	1241	1241	15	1241	AS, Above, moist
620'	1251	1251	15	1251	AS, Above, moist
625'	1261	1261	15	1261	AS, Above, moist
630'	1271	1271	15	1271	AS, Above, moist
635'	1281	1281	15	1281	AS, Above, moist
640'	1291	1291	15	1291	AS, Above, moist
645'	1301	1301	15	1301	AS, Above, moist
650'	1311	1311	15	1311	AS, Above, moist
655'	1321	1321	15	1321	AS, Above, moist
660'	1331	1331	15	1331	AS, Above, moist
665'	1341	1341	15	1341	AS, Above, moist
670'	1351	1351	15	1351	AS, Above, moist
675'	1361	1361	15	1361	AS, Above, moist
680'	1371	1371	15	1371	AS, Above, moist
685'	1381	1381	15	1381	AS, Above, moist
690'	1391	1391	15	1391	AS, Above, moist
695'	1401	1401	15	1401	AS, Above, moist
700'	1411	1411	15	1411	AS, Above, moist
705'	1421	1421	15	1421	AS, Above, moist
710'	1431	1431	15	1431	AS, Above, moist
715'	1441	1441	15	1441	AS, Above, moist
720'	1451	1451	15	1451	AS, Above, moist
725'	1461	1461	15	1461	AS, Above, moist
730'	1471	1471	15	1471	AS, Above, moist
735'	1481	1481	15	1481	AS, Above, moist
740'	1491	1491	15	1491	AS, Above, moist
745'	1501	1501	15	1501	AS, Above, moist
750'	1511	1511	15	1511	AS, Above, moist
755'	1521	1521	15	1521	AS, Above, moist
760'	1531	1531	15	1531	AS, Above, moist
765'	1541	1541	15	1541	AS, Above, moist
770'	1551	1551	15	1551	AS, Above, moist
775'	1561	1561	15	1561	AS, Above, moist
780'	1571	1571	15	1571	AS, Above, moist
785'	1581	1581	15	1581	AS, Above, moist
790'	1591	1591	15	1591	AS, Above, moist
795'	1601	1601	15	1601	AS, Above, moist
800'	1611	1611	15	1611	AS, Above, moist
805'	1621	1621	15	1621	AS, Above, moist
810'	1631	1631	15	1631	AS, Above, moist
815'	1641	1641	15	1641	AS, Above, moist
820'	1651	1651	15	1651	AS, Above, moist
825'	1661	1661	15	1661	AS, Above, moist
830'	1671	1671	15	1671	AS, Above, moist
835'	1681	1681	15	1681	AS, Above, moist
840'	1691	1691	15	1691	AS, Above, moist
845'	1701	1701	15	1701	AS, Above, moist
850'	1711	1711	15	1711	AS, Above, moist
855'	1721	1721	15	1721	AS, Above, moist
860'	1731	1731	15	1731	AS, Above, moist
865'	1741	1741	15	1741	AS, Above, moist
870'	1751	1751	15	1751	AS, Above, moist
875'	1761	1761	15	1761	AS, Above, moist
880'	1771	1771	15	1771	AS, Above, moist
885'	1781	1781	15	1781	AS, Above, moist
890'	1791	1791	15	1791	AS, Above, moist
895'	1801	1801	15	1801	AS, Above, moist
900'	1811	1811	15	1811	AS, Above, moist
905'	1821	1821	15	1821	AS, Above, moist
910'	1831	1831	15	1831	AS, Above, moist
915'	1841	1841	15	1841	AS, Above, moist
920'	1851	1851	15	1851	AS, Above, moist
925'	1861	1861	15	1861	AS, Above, moist
930'	1871	1871	15	1871	AS, Above, moist
935'	1881	1881	15	1881	AS, Above, moist
940'	1891	1891	15	1891	AS, Above, moist
945'	1901	1901	15	1901	AS, Above, moist
950'	1911	1911	15	1911	AS, Above, moist
955'	1921	1921	15	1921	AS, Above, moist
960'	1931	1931	15	1931	AS, Above, moist
965'	1941	1941	15	1941	AS, Above, moist
970'	1951	1951	15	1951	AS, Above, moist
975'	1961	1961	15	1961	AS, Above, moist
980'	1971	1971	15	1971	AS, Above, moist
985'	1981	1981	15	1981	AS, Above, moist
990'	1991	1991	15	1991	AS, Above, moist
995'	2001	2001	15	2001	AS, Above, moist
1000'	2011	2011	15	2011	AS, Above, moist
1005'	2021	2021	15	2021	AS, Above, moist
1010'	2031	2031	15	2031	AS, Above, moist
1015'	2041	2041	15	2041	AS, Above, moist
1020'	2051	2051	15	2051	AS, Above, moist
1025'	2061	2061	15	2061	AS, Above, moist
1030'	2071	2071	15	2071	AS, Above, moist
1035'	2081	2081	15	2081	AS, Above, moist
1040'	2091	2091	15	2091	AS, Above, moist
1045'	2101	2101	15	2101	AS, Above, moist
1050'	2111	2111	15	2111	AS, Above, moist
1055'	2121	2121	15	2121	AS, Above, moist
1060'	2131	2131	15	2131	AS, Above, moist
1065'	2141	2141	15	2141	AS, Above, moist
1070'	2151	2151	15	2151	AS, Above, moist
1075'	2161	2161	15	2161	AS, Above, moist
1080'	2171	2171	15	2171	AS, Above, moist
1085'	2181	2181	15	2181	AS, Above, moist
1090'	2191	2191	15	2191	AS, Above, moist
1095'	2201	2201	15	2201	AS, Above, moist
1100'	2211	2211	15	2211	AS, Above, moist
1105'	2221	2221	15	2221	AS, Above, moist
1110'	2231	2231	15	2231	AS, Above, moist
1115'	2241	2241	15	2241	AS, Above, moist
1120'	2251	2251	15	2251	AS, Above, moist
1125'	2261	2261	15	2261	AS, Above, moist
1130'	2271	2271	15	2271	AS, Above, moist
1135'	2281	2281	15	2281	AS, Above, moist
1140'	2291	2291	15	2291	AS, Above

MONITORING WELL CONSTRUCTION LOG -- Standard		
WELL NO.: OW-2	Installation: MMR	Site: Greenway Rd.
Project No.: 9750184	Client/Project: HAZWRAP / MMR	AREA
HAZWRAP Contractor: ASI		Drig Contractor: BEI
Comp. Start: 8/29/93 (10:35 AM)	Comp. End: 8/29/93 (18:00 PM)	
Built By: BEI (A. Bortelle, ASI (G. Mayner		Well Coord: _____



PROTECTIVE CSG
Material / Type Carbon steel 5 ft length
Diameter 2.75 in 9/14/93 0.6
Depth BGS 2.7 Weep Hole (Y/N)

GUARD POSTS (Y/N)
No. 4 Type carbon steel 0.3' diam
filled with cement

SURFACE PAD
Composition & Size cement 2x2x4-inch

RISER PIPE
Type Schedule 80 PVC (Bedrock)
Diameter 2-inch
Total Length (TOC to TOS) 63.12' (stickup 2.05')
Ventilated Cap (Y/N)

GROUT
Composition & Proportions Volclay, ~4.8 SKS
of Volclay (50 lbs/SK) and ~120 gal wtr
Tremied (Y/N)
Interval BGS 1.5 - 57' bgs

CENTRALIZERS (Y/N)
Depth(s) N/A

SEAL
Type 4-inch Bentonite Pellets 1.5 SKS (50 lbs/SK)
Source "Barad" Peltonite - BEI
Setup/Hydration time ~0.5 Hr. Vol. Fluid Added 10 gal
Tremied (Y/N) wtr.

FILTER PACK
Type Morie #1 MESH Silica
Amt. Used 15.5 SKS (100 lbs/SK)
Tremied (Y/N)
Source BEI - Morie
Gr. Size Dist. medium/coarse silica sand

SCREEN 41.37'
Type stainless steel (Johnson)
Diameter 2-inch
Slot Size & Type 0.01-inch contravous
Interval BGS 61.07 - 102.44'
Stainless steel

SUMP (Y/N) 102.44 - 104.44' Length 2'
Interval BGS
Bottom Cap (Y/N) 104.44 - 104.67

BACKFILL PLUG 99 - 110' "HEAVING SAND"
Material NATIVE SAND COLLAPSE
Setup/Hydration time N/A
Tremied (Y/N) N/A

GKM



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WELL DEVELOPMENT LOG		WELL NO: DW-2
Installation: MMR		Site: Greenway Rd.
Project No. 9750.K04.3.09		
Dev. Start: 9-2-93	Dev. End: 9-2-93	Csq Dia: 2-inch
Developed by: Mitchell (ASI)		Dev. Rig (Y/N)

Dual Line

Dev. Method: Air/Lift development. Purge 3-5 well volumes with measured parameters being within $\pm 10\%$ for consecutive volumes, and/or until silt free. TD: 104.67 bgs
WT: 89.85 bgs

14.78' water Column

Equipment: Dual Pipe - 3/4 inch discharge base (poly), 1/2 inch air hose.

Lindsey Air Compressor - 80 CFM

1 volume - 2.45'

3 volumes - 7.25'

Pre-Dev. SWL: 89.85 bgs Maximum drawdown during pumping: N/A ft at N/A gpm

Range and Average Discharge rate: varies due to air pressure - 1 pint to 1 quart per min gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: 20-22 gal

Disposition of discharge water: Clear

0910 - Start Compressor 10 gal was pumped by Grandfos on 9-1-93
0930 - Restart - Pump was clogged.

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
0942	2.5	NA	NA	sl. milky	16.9	6.8	207	1st volume
1004	2.5	NA	NA	clear	16.5	6.6	155	2nd volume
1012	2.5	NA	NA	clear	16.4	6.8	150	3rd volume
1023	2.5	NA	NA	clear	16.8	6.6	148	4th volume

FM00WEL3

Note: 100 gcl added during installation will not be removed due to Air/Lift method being slow. 100 gcl should be purged before collecting any chemical analysis. MMR

BORING LOG		BORING/WELL NO.: OW-3		Page 1 of 1	
Installation: MMR			Site: OW-3 Greenway Rd. MMR		
Project No.: 9750, K04.3-09		Client/Project: HAZWRAP / MMR			
HAZWRAP Contractor: ASI		Drill Contractor: BEI		Driller: Dan Gotto	
Drill Started: 8/10/93 (15:40 P.M.)		Drill Ended: 8/10/93 (16:55 P.M.)		Borehole dia(s): 7.25-inches	
Drill Method/Rig Type: CME-75 Hollow Stem Augers - (4.25-inch ID)					
Logged by: GM, MM		E-Log (Y/N) From to		Protection Level: D	

Depth (ft)	Sample No.	Lab Anal.	Recovery (%)	Lithologic Description	USCS	Blows / 6 inch	Graphic Log	Well data	Water depth	Remarks	Elev.
0				* No split: spoons, cuttings only							
10				0 - ~20' (?) estimated	Sand and Gravel, lt. brn. well graded sand w/ some silt, well graded gravel (pea-cobble/boulder size), fr. moisture, loose. (\$W)	\$W					
20											
30											
40											
50											
60				~20 - 107' (TD)	Sand, lt brn., dominantly medium grained, with well graded gravel - minor silt						
70											
80											
90											
100											
110				TD ~ 107' bgs							
120				② lt brn = Grayish orange 10YR 7/4 to mod Yellowish Brn. 10YR 5/4 (Munsell).							
130											
140											
150				* added ~ 10 gallons to auger ID prior to knocking out end plate (potable wtr.).							
160											
170											

* wtr level 93.92' bgs 8/20/93

U = Thin Wall Tube	R = Rock Coring	Field G/C (Make/Mod.)
S = Split spoon (tube)	O = Other	G/C Oper.:
(C) = Cuttings Notes:		

MONITORING WELL CONSTRUCTION LOG - Standard Flush Mount		
WELL NO.: OW-3	Installation: MMR	Site: OW-3
Project No.: 750, Riv. 7	Client/Project: HAZWRAP / MMR	
HAZWRAP Contractor: ASI	Drig Contractor: BEI	
Comp. Start: 8/18/93 (17:10 P.m)	Comp. End: 8/19/93 (11:10 A.m)	
Built By: BEI (D. Gatto) ASI (Gm, mm)		Well Coord.: .

Elev. _____
 Height SURFACE
 GS Elev. _____
 GS Height 0.00'
 Depth BGS _____

Elev. _____
 Depth BGS 0.35'

* wtr level
 93.92' bgs
 8/19/93

* added ~10
 gallons to
 AVER ID
 prior to well
 installation,

79
 81
 83.16

2

25.12

22.84

103.84

106.12

106.12

0.5

native
 sand
 collapse

TD: 107
 (106.5)

Borehole dia.
 AUGER OD

PROTECTIVE CSG

Material / Type metal "box" 1.5 ft length
 Diameter 0.75 ft
 Depth BGS ~1.5 ft
 Watertight O-Ring (Y/N) bolted lid.

SURFACE PAD

Composition & Size 2 x 2 ft x 4 inch cement
 Breaches With Vadose Zone (Y/N)

RISER PIPE

Type Schedule 80 PVC (Bedrock)
 Diameter 2-inch
 Total Length (TOC to TOS) surface - 83.16'
 Ventilated Cap (Y/N) PVC slip-on.

GROUT

Composition & Proportions cement/Bentonite
4 bags cement (100 lb / bag Portland Type
 Tremied (Y/N) I (II) with 1 Bag (50 lb / bag)
 Interval BGS Bentonite Powder, 100 - 130'
surface to 79

CENTRALIZERS

Depth(s) N/A

SEAL

Type Bentonite Pellets 1/4 inch
 Source "BAZARD" (BEI)
 Setup/Hydration time 14 Hrs. Vol. Fluid Added 5 gal.
 Tremied (Y/N) potable
on 8/19/93 wtr.

FILTER PACK

Type Morie #1 mesh silica
 Amt. Used 7.5 SKS (100 lbs / SK)
 Tremied (Y/N)
 Source Morie (BEI)
 Gr. Size Dist. med - coarse

SCREEN

Type stainless steel (Johnson)
 Diameter 2-inch
 Slot Size & Type 0.01-in. continuous
 Interval BGS 83.16 - 103.84

SUMP

Interval BGS 103.84 - 105.89 Length 2.05
 Bottom Cap (Y/N) 105.89 - 106.12

BACKFILL PLUS

Material native sand collapse
 Setup/Hydration time N/A
 Tremied (Y/N)

GKm



ADVANCED SCIENCES, INC.

Fieldlog: MMR BOOK # 32

WELL DEVELOPMENT LOG		WELL NO: OW-3
Installation: MMR		Site: Greenway Rd.
Project No. 9750.K04.3.09		
Dev. Start: 8/22/93 1132	Dev. End: 8/22/93 1155	Csq Dia: 2-inch
Developed by: G. Maynor (ASI) C. Thiele (BEI)		Dev. Rig (Y/N)

Dev. Method: 2-inch electric submersible pump (Grundfos) w/ 1/2-inch polyethylene tubing. Purge 3-5 well volumes until sediment free and measured parameters are within 10% on 3 consecutive readings. Lower/purge over 3-5' sections of section.
Equipment: (see above.)

$$TD \geq 106.12 - 93.84' (SWL) = 12.28' \text{ wtr column} \times 0.16 \frac{\text{gal}}{\text{ft}} = 1.965 \text{ gal per rev.}$$

Pre-Dev. SWL: 93.84' bgs
3 vol. = 4 gal + 10 gal (drilling ahead) = 26 gal minimum
Maximum drawdown during pumping: N/A ft at N/A gpm

Range and Average Discharge rate: ~1.5 gal/min gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: - 27 gal.

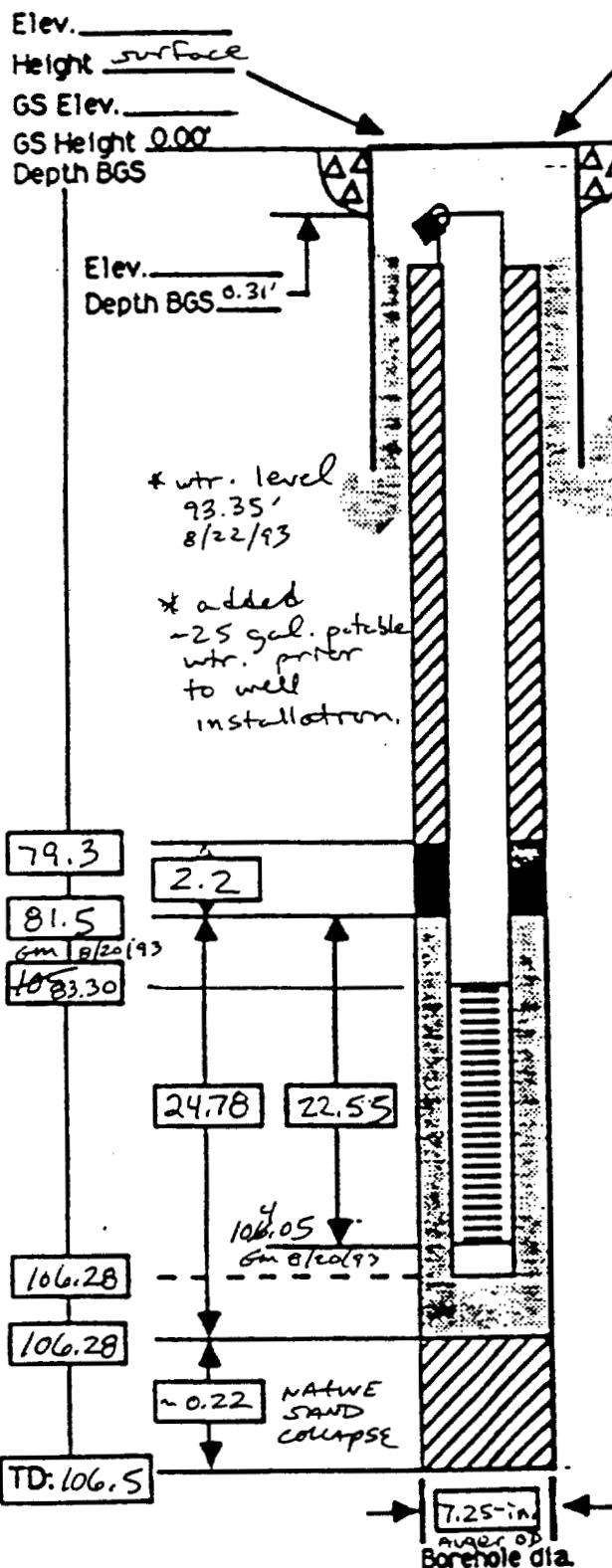
Disposition of discharge water: clear to sli. tint

to go 1132 start pump (set 5-6 ft off bottom)
1133 pumping - 1.5 gal/min.

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
1134	~3	N/A	yes	lt. brn.	13.7	6.34	118	
1136	~6	N/A	sli.	milky	13.6	6.39	119	
1138	~9	N/A	tr.	sli. tint	13.4	6.37	111	
1140	~12	N/A	NO	tr. tint	13.3	6.41	110	
* 1143	step up cuts (max < 2 gal/min.)	to ~2 gal/min	lower	lower	to 2 ft off bottom			Pump rate approaches/exceeds 2 gal/min. Wtr became turbid, then cleared when pump lowered.
1151	~21	N/A	tint	tint	13.8	6.41	109	
1154	~26	N/A	clear	clear	13.84	6.31	101	
* 1155 stopped purge ~27 gal (clear wtr.)								

GKM
FMONWEL3

MONITORING WELL CONSTRUCTION LOG -- Standard Flush Mount		
WELL NO.: DW-4	Installation: MMR	Site: DW-4
Project No.: 9250-K04	Client/Project: HAZWRAP/MMR	
HAZWRAP Contractor: ASI	Drig Contractor:	
Comp. Start: 8/19/93 (13:42 P.m)	Comp. End: 8/19/93 (16:40 P.m)	
Built By: BEI (D. Gotto) ASI (GM)	Well Coord.: .	

**PROTECTIVE CSG**

Material / Type metal "box" 1.5 ft length
 Diameter 0.75 ft
 Depth BGS ~1.5 ft
 Watertight O-Ring (Y/N) bolted lid.

SURFACE PAD

Composition & Size 2x2 ft x 4-in cement
 Breathes With Vadose Zone (Y/N)

RISER PIPE

Type Schedule 80 PVC (Bedrock)
 Diameter 2-inch
 Total Length (TOC to TOS) surface to 83.30'
 Ventilated Cap (Y/N)

GROUT

Composition & Proportions 7 Bags (94 lbs/bag) Portland Type I/II Cement, 2 Bags Powdered Bentonite (50 lbs/bag) and ~300 gal wtr.
 Tremied (Y/N)
 Interval BGS surface - 79.3'

CENTRALIZERS

(Y/N) N/A
 Depth(s) N/A

SEAL

Interval BGS 79.3-81.5
 Type Bentonite Pellets 1/4-inch ~1.25 BKts.
 Source "Banco ID" (BEI) (50 lbs/Bkt.)
 Setup/Hydration time 0.5 hr. Vol. Fluid Added 5 gal potable wtr.
 Tremied (Y/N)

FILTER PACK

Type Morie #1 Mesh Silica
 Amt Used 6 SKs. (100 lbs/SK.)
 Tremied (Y/N)
 Source Morie (BEI)
 Gr. Size Dist. medium/coarse

SCREEN

Type stainless steel (Johnson)
 Diameter 2-inch
 Slot Size & Type 0.01-inch continuous
 Interval BGS 83.30 - 104.05

SUMP

(Y/N) 104.05-106.05 Length 2 ft
 Interval BGS 104.05-106.05
 Bottom Cap (Y/N) 106.05-106.28 (0.23)

BACKFILL PLUS

Interval BGS 106.28 - 106.5 (est)
 Material NATIVE SAND COLLAPSE
 Setup/Hydration time N/A
 Tremied (Y/N)

GKm



ADVANCED SCIENCES, INC.

Fieldlog: MMR Book #32

WELL DEVELOPMENT LOG			WELL NO: OW-4
Installation: MMR			Site: OW-4 MMR
Project No. 9750.K04.3.09			
Dev. Start: 8/22/93	Dev. End: 8/22/93	Csq Dia: 2-inch	
Developed by: BEI (C. Thiele), ASI (G. Maynor)			Dev. Rig (Y/N)

Dev. Method: 2-mch electric submersible pump (Grundfos)
w/ 1/2-mch polyethylene tubing. Purge 3-5 well casing
volumes and until sediment free and within 10% on
3 volume readings for pH and conductivity. 1 well
 Equipment: volume = 106.28 TD - 93.35 (SWL) = 12.93' x 0.16 gal
= 2.1 gal. minimum purge = 6.2 + 25 gal wtr added during drilling
= 31.2 gal.

Pre-Dev. SWL: 93.35' bgs Maximum drawdown during pumping: N/A ft at N/A gpm
Gm 8/22/93

Range and Average Discharge rate: ~1.5 gal/min to 1 gal/min gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: 35 gal

Disposition of discharge water: clear, no odor.

Began pump 1013 rate ~2.5 gal/min cut back to ~1.5 gal/min, set ~4' off bottom

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
1015	~2.1	N/A	— yes	lt. brn.	13.4	5.92	91	
1017	~4.2	N/A	— yes	lt. brn	14.1	5.88	85	
1020	~6.3	N/A	slight	v. lt. tint	14.9	6.07	92	
1024	~12	N/A	tr. cloudy	milky, sl.	14.6	6.09	90	
1034	~18	N/A	trace	sl. milky	13.2	6.38	89	
1036	~21	N/A	v. sl. tr.	tr. milky	13.2	6.35	89	
1039	~26	N/A	clear	clear	13.3	6.38	89	
1042	~31	N/A	clear	clear	13.4	6.36	87	
1044	~34	N/A	clear	clear	13.5	6.37	87	
1045	Stop pump		~35 gal total purge.					

~1.5 gal/min
 read →
 4' off
 from
 turbid
 25 gal
 removed.

Added
 wtr
 effect

GKm
 FMONWELS

BORING LOG	BORING/WELL NO.: PR-1	Page 1 of 1
Installation: MMR		Site: PR-1 Greenway Rd. Area
Project No.: 9750, K04, 309	Client/Project: HAZWRAP / MMR	
HAZWRAP Contractor: ASI	Drill Contractor: BET	Driller: A. Bortelle
Drill Started: 8/31/93 (15:00 PM)	Drill Ended: 9/1/93 (10:15 AM)	Borehole dia(s): ~ 18-inch +
Drill Method/Rig Type: CME-95 w/ 12 1/4-inch ID HSA5		
Logged by: G. Mayner	E-Log (Y/N) From to	Protection Level: D

Depth (ft)	Sample No.	Lab Anal. (Y/N)	Recovery (%)	Lithologic Description	USCS	Blows / 6 inch	Graphic Log	Well data	Water depth	Remarks
0				* cuttings only, no samples.						
10				0-30' Sand and Gravel, @ H. brn., well graded sand w/ some silt, well graded gravel (pea-cobble/boulder size), fr. moisture, loose (\$W).						
20										
30										
40										
50				~ 30-125' (TD) Sand, lt. brn., dem. medium grained, with minor (~15%) well graded gravel, fr. moisture to v. moist, loose. (\$P)						
60										
70										
80										
90										
100										
110										
120				TD 125 ft.						
130				* Added 200-230 gal of potable wtr during pre well-installation - drilling activity.						
				@ H. brn. = Grayish Orange 10YR 7/4 to Mod. Yellowish Brown 10YR 5/4 (Munsell chart).						

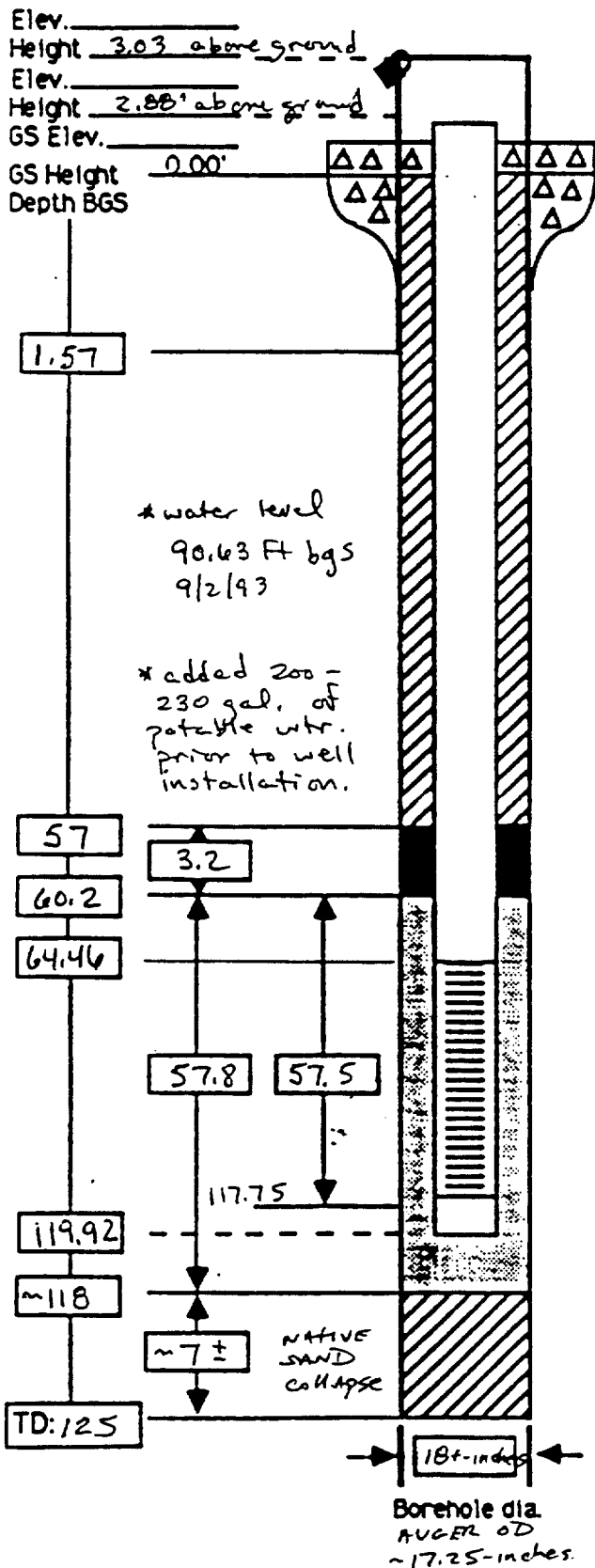
depths unknown, cuttings only.

* wtr level

U = Thin Wall Tube R = Rock Coring Field G/C (Make/Mod.)
 S = Split spoon (tube) O = Other G/C Oper.:
 C = Cuttings Notes:

MONITORING WELL CONSTRUCTION LOG -- Standard

WELL NO.: PR-1 Installation: MMR Site: MMR Greenway Rd. Area
 Project No.: 7750. K04.3 Client/Project: HAZWRAP / MMR
 HAZWRAP Contractor: ASI Drig Contractor: BEI
 Comp. Start: 9/1/93 (10:38 AM) Comp. End: 9/2/93 (16:40 PM)
 Built By: A. Boutorille (BEI), G. Maynor (ASI) Well Coord: .



PROTECTIVE CSG

Material / Type carbon steel ~ 4.6' length
 Diameter 0.83' 6m 9/1/93
 Depth BGS ~ 1.57' Weep Hole (Y/N)

GUARD POSTS (Y/N)

No. 4 Type 0.3' diameter
 carbon steel w/ cap

SURFACE PAD

Composition & Size 2 x 2 ft x 4+ in. concrete

RISER PIPE

Type Schedule 80 PVC (Bedrock)

Diameter 8-inch

Total Length (TOC to TOS)

Ventilated Cap (Y/N)

GROUT

Volclay Grout
 Composition & Proportions 27 bgs (50lb/bgs)
 w/ 1225 gal (est) potable wtr.

Tremied (Y/N)

Interval BGS surface - .57' bgs

CENTRALIZERS (Y/N)

Depth(s) N/A

SEAL

Type Bentonite Pellets 1/4-inch, 3 Bkts (50lb/bks)

Source Bardon + Pettanite, BEI

Setup/Hydration time 15+ hrs Vol. Fluid Added ~ 20

Tremied (Y/N)

FILTER PACK (60.2 - 118 ft bgs)

Type Morie #1 Mesh Silica

Amt. Used 30 sfs. (100 lbs/sfs)

Tremied (Y/N)

Source Morie, BEI

Gr. Size Dist. medium-coarse

SCREEN

Type stainless steel (Cooke)

Diameter 8-inch

Slot Size & Type 0.03-inch continuous

Interval BGS 64.46 - 117.75

stainless steel (2.17' length)

SUMP (Y/N)

Interval BGS 117.75-119.92 Length 2.17'

Bottom Cap (Y/N) part of sump.

BACKFILL PLUG

Material NATIVE SAND collapse

Setup/Hydration time N/A

Tremied (Y/N)



ADVANCED SCIENCES, INC.

Fieldbook # 32 (MMR)

WELL DEVELOPMENT LOG			WELL NO: PR-1		
Installation: MMR			Site: FS-12		
Project No. 9750.K04.3.09			Greenway Rd.		
Dev. Start: 9/9/93 0905		Dev. End: 9/9/93 1519		Csq Dia: 8-inch	
Developed by: A. Bortelle (BEI), G. Maynor, M. Miracle (ASI)			Dev. Rig (Y/N) CME-95		

Dev. Method: surge and pump. Downhole hammer with surge plate attached at the base, and 4-inch Grundfos electric submersible pump. Minimum
Purge = 90.65 - 119.92 = 29.27' wtr column x 2.6 gal/ft (8-inch) (3)
Equipment: (see Dev. method) = 228 gal
228 gal + 230 gal (added during drilling)

Pre-Dev. SWL: 90.65 Ft bgs = 458 gal.
 Maximum drawdown during pumping: N/A ft at N/A gpm

Range and Average Discharge rate: ~ 9 gal/min. gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: Brown turbid to slightly tinted/clear.

Disposition of discharge water:

* Surged entire well screen 3 times with 30-45 minutes/time.
 Followed by pumping from ~ 110 - 115 Ft until purge wtr was cleared of sediment.

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
1346	~330	N/A	lt. brn. slight	lt. brn.	14.0	6.03	338	odor
1356	~410	N/A	Slight	v. lt. brn.	13.9	6.13	284	OD012
1444	~515	N/A	slight-medium	lt. brn.	14.1	6.07	330	odor
1454	~605	N/A	slight	v. lt. brn.	13.4	6.06	272	72 - 357 ppm
1502	~680	N/A	trace	tint	13.8	6.07	278	purge Drwn
1513	~770	N/A	No	sl. tint.	13.6	6.08	268	OD0R
1519	~825	N/A	End pumping sl. tint/clear.					

BORING LOG	BORING/WELL NO.: PR-1 (PR-1-SB offset)	Page 1 of 1
Installation: MMR	Site: PR-1 Greenway Rd	
Project No.: 975-K043.09	Client/Project: HAZWRAP/MMR	
HAZWRAP Contractor: ASI	Drill Contractor: BEI	Driller: Andre Bortolite
Drill Started: 8/24/93 (7:40 A.M.)	Drill Ended: 8/26/93 (10:45 A.M.)	Borehole dia(s): 18-inch
Drill Method/Rig Type: CME-95 w/ (2 1/2-inch ID) HSA		
Logged by: GM	E-Log (Y/N) From to	Protection Level: D to 115

* No samples, cuttings only.

Depth (ft)	Sample No.	Lab Anal (Y/N)	Recovery (N/A)	Lithologic Description	USCS	Blows/6 inch.	Graphic Log	Well data	Water depth & Remarks	Elim
0				0 - 35? Sand and Gravel, (H) brown, well graded sand w/ some silt, well graded gravel (pea-cobble/boulder size), tr. moisture, loose (\$W).	N/A					
10	C	N	N							
20										
30										
40				35-72 125' TD Sand, lt. brown dm. medium grained, with minor well graded gravel (5-15%) tr. moisture, loose (\$P)						
50	C									
60										
70										
80										
90										
100	C									
110										
120										
				TD 125'						
				(2) lt. brown = Grayish Orange 10YR 7/4 to Mod. Yellowish Brown 10YR 5/4 (Munsell Chart).						

Driller notes
cable
zone ~
60 ft bgs.

* water
level

correct
depths
not
known,
cuttings
only.

** added 50 gallons wtr.
to borehole - post
drilling/pre well
installation.

U = Thin Wall Tube	R = Rock Coring	Field G/C (Make/Mod.)
S = Split spoon (tube)	O = Other	G/C Oper.:
C = Cuttings	Notes:	

BORING LOG	BORING/WELL NO.: PR-1-SB	Page 1 of 1
Installation: MMR	(originally PR-1)	Site: (PR-1-SB) Greenway Rd
Project No.: 9750104.3-01	Client/Project: HAZWRAP/MMR	ARCA
HAZWRAP Contractor: A-SI	Drig Contractor: BEI	Driller: D. Gatto (4.25-inch ID)
Drig Started: 8/20/93 (8:47 A.M.)	Drig Ended: 8/20/93 (2:30 P.M.)	Borehole dia(s): 7.25-inch
Drig Method/Rig Type: CME-75 Hollow Stem Auger - (4.25-ID)	Auger ID	
Logged by: GM	E-Log (Y) (N) From _____ to _____	Protection Level: 1

* Drilled hole w/ 12.25-inch ID augers 0-5 ft (1720-1730, 8/24/93). * Andre Bortolice (CME-95 Driller)
 Drilled 5-70 ft (0730-1040).
 Pulled augers. Filled borehole w/ cuttings. Moved 10' to the NE.
 LITHOLOGIC DESCRIPTION

Depth (ft)	Sample No.	Lab Anal. (Y/N)	Recovery (ft)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth	Remarks	Elev.
0-14-15				0-35? Sand and Gravel, lt. brown, well graded sand w/ some silt, well graded gravel (pea-cobble/boulder size), tr. moisture, loose (\$W).	\$W						
28	C	N	N								
42											
56				35-72. Sand, lt. brn, dom. med. grain, well graded gravel-minor moisture, loose, tr. moisture, loose, (\$P).	\$P						
70	C	N	N	NO SAMPLE	\$P	N/A					
	S	N	N	Sand, Gray to lt. brn, dom. med. grain w/ 5-10% fine sand/silt, cohesive, well graded pea gravel, v. moist	\$W	N/A					
					\$P						
75	S	N	N	Sand, lt. brown, med. grain, w/ minor pea gravel (5-2), loose, tr. moisture	\$P	N/A					
	S	N	N	AS Above, lt. brown - orange lt. brown, sli. moist to moist.	\$P						
80	S	N	N	AS Above.	\$P						
	S	N	N	AS Above, moist.	\$P						
	S	N	N	AS Above.	\$P					PR-1-P40-082093 VOC, TPH, TOC	
85	S	N	N	AS Above, odor.	\$P						
	S	N	N	AS above, some gray coloration on sand. odor.	\$P					PR-1-BB-MS-082093 VOC/TPH PR-1-P4-MSD-082093 VOC/TPH	
	S	N	N	AS above, odor	\$P						
90	S	N	N	AS Above, v. moist odor	\$P					* wtr level 4.25-inch AUGERS 0-90 f bgs 0847-1200 08/20/93	
				END 8/20/93							
				* USING BEI CME-95 (Andre Bortolice driller)							
				* 8/24-25/93 REAMED hole with 4.25-inch ID augers with 12.25-inch ID augers from 0-70 ft bgs. Abd. hole at 70'. Unable to advance augers due to friction along angled borehole. Pulled augers, cuttings filled borehole to surface.							
95											

U = Thin Wall Tube	R = Rock Coring	Field G/C (Make/Mod.)
(S) Split spoon (tube) 2 x 24 inch	O = Other	G/C Oper.:
(C) Cuttings	Notes:	

① lt brn = Grayish ORANGE 10 YR 7/4 to Mod. Yellowish Brown 10 YR 5/4 (MUNSELL).
 * VOC = BTEX only.

BORING LOG	BORING/WELL NO.: WT-18	Page 1 of 1
Installation: MMR	Site: FS-12	
Project No.: 9750. K43.09	Client/Project: HAZWRAP/MMR	
HAZWRAP Contractor: A-S-I	Drig Contractor: BEI	Driller: A. Boutelle
Drig Started: 9/12/93 08:10 A.m	Drig Ended: 8/9/12/93 11:20 A.m	Borehole dia(s): 7.25-inch
Drig Method/Rig Type:	On 9/12/93	Auger OD
Logged by: G. Maynor	E-Log (Y/N) From to	Protection Level: D

Depth (ft)	Sample No.	Lab Anal. (Y/N)	Recovery (Ft)	Lithologic Description	USCS	Blows / 6 inch.	Graphic Log	Well data	Water depth	Remarks	Elev. ft.
14				- No samples, cuttings only.							
28	N/A	N/A		0-30(?) Sand and Gravel, lt. brn., well graded sand w/ some silt, well graded gravel (pea to boulder size), fr. moisture to moist, loose. (SW)	SP	N/A				cobbles ~ 40'	
42											
56				30?-70 Sand, lt. brn., dom. med. grn. w/ minor well graded gravel (<15%) fr. moist/moist	SP						
70				Sand, lt. brn., dominantly medium grained, with minor gravel (<15%) trace, moisture, loose.	SP						
			54/1.2	AS Above.	SP						
			53/1.4	AS Above.	SP						
75			86/1.3	AS Above.	SP					QA/QC TB-05MR2-1	
			160/1.5	AS Above	SP			BTEX TOC TPH			
			84/1.0	AS Above.	SP						
80			122/1.4	AS Above.	SP						
			71/1.7	AS Above.	SP						
85			173/1.3	AS Above	SP			BTEX TOC TPH			
			112/1.6	AS Above.	SP						
			153/1.7	AS Above, some coarse gravel, v. moist to wet.	SP			BTEX TOC TPH		*wtr level 88.79 ft by 5 9/13/93	
90											
92											
94											
96											
98											
100											
102											

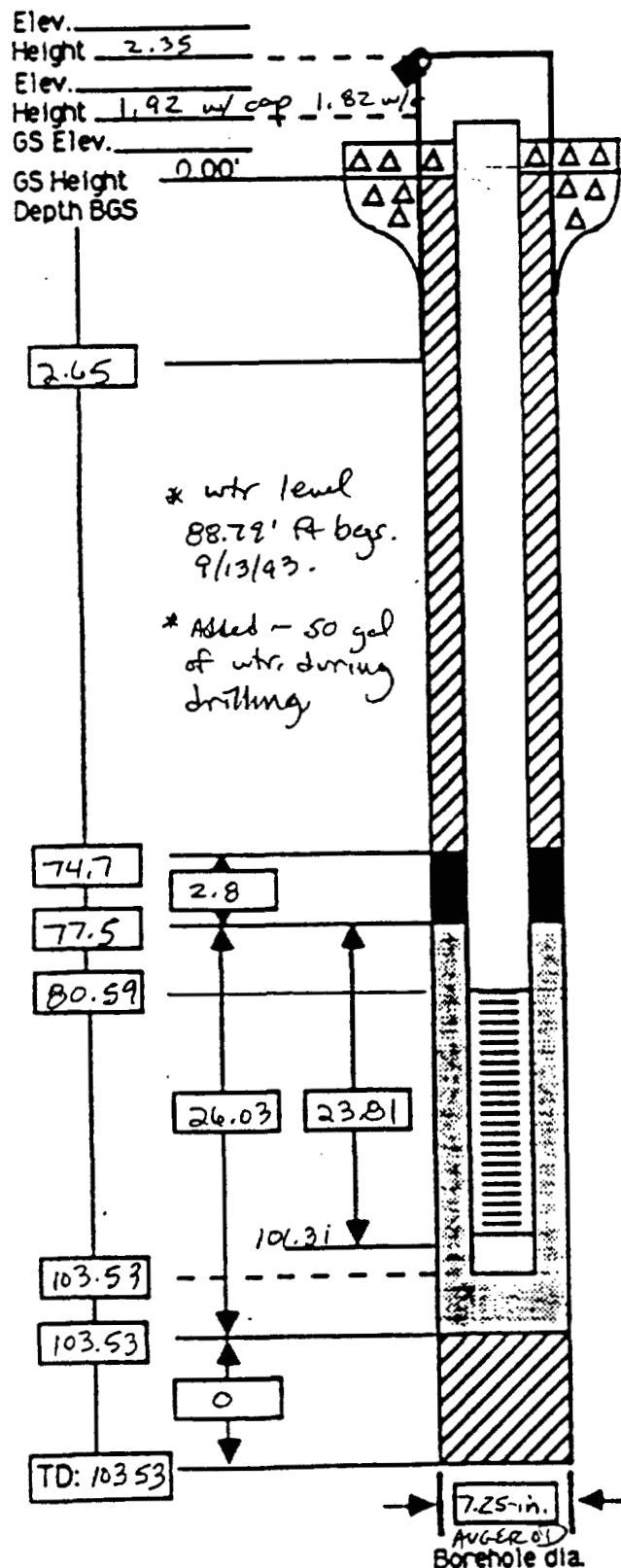
* Added 50 gal wtr ~ 90' on 9/12/93. ID 103'

U = Thin Wall Tube	R = Rock Coring	Field G/C (Make/Mod.):
(S) = Split spoon (tube) 2 x 2 1/2-inch	O = Other	G/C Oper.:
(C) = Cuttings	Notes:	

⊗ lt. brn. = Grayish Orange 10 YR 7/4 to moderately Yellowish Brown 10 YR 5/4 (Munsell Chart)

MONITORING WELL CONSTRUCTION LOG -- Standard

WELL NO.: WT-18	Installation: MMR	Site: FS-12
Project No. 9750-2043.09 Client/Project: HAZWRAP		
HAZWRAP Contractor: ASI		Drig Contractor: BEI
Comp. Start: 9/12/93 (11:10 A.M.)		Comp. End: 9/12/93 (15:45 P.M.)
Built By: G. Maynor (ASI), A. Bortolte (BEI)		Well Coord: .



PROTECTIVE CSG

Material/Type 5-ft carbon steel
 Diameter 6.75" 0.6'
 Depth BGS 2.65' Weep Hole (Y/N)

GUARD POSTS

(Y/N)
 No. 4 Type 0.3' diameter carbon steel w/ concrete

SURFACE PAD

Composition & Size 2x2 ft x 4 inch concrete

RISER PIPE

Type Schedule 80 PVC (Bedrock)
 Diameter 2-inch
 Total Length (TOC to TOS) 82.41'
 Ventilated Cap (Y/N)

GROUT

Volclay Grout
 Composition & Proportions 6 bags (50 lbs/bag) w/ ~175 gal water

Tremied

(Y/N) surface to 74.7'

CENTRALIZERS

(Y/N) N/A

SEAL

74.7 - 77.5' (50 lbs/bkt.)
 Type 4-inch Bentonite Pellets, 1.5 Buckets
 Source Pelfrite/BEI
 Setup/Hydration time 1/2 hr. Vol. Fluid Added 10 gal
 Tremied (Y/N) 0.33

FILTER PACK

Type Moric #1 mesh silica
 Amt. Used
 Tremied (Y/N)
 Source Moric/BEI
 Gr. Size Dist. medium to coarse

SCREEN

Type stainless steel (Johnson)
 Diameter 2-inch
 Slot Size & Type 0.01-inch, continuous
 Interval BGS 80.59 - 101.31

SUMP

(Y/N)
 Interval BGS 101.31 - 103.3' Length 1.99'

Bottom Cap (Y/N) 103.3 - 103.53

BACKFILL PLUG

Material
 Setup/Hydration time
 Tremied (Y/N)



ADVANCED SCIENCES, INC.

WELL DEVELOPMENT LOG		WELL NO: <u>WT-18</u>
Installation: <u>MMR</u>		Site: <u>FS-12</u>
Project No. <u>9750.K04.3.09</u>		
Dev. Start: <u>7-13-93/1530</u>	Dev. End: <u>7-13-93/1605</u>	Csq Dia: <u>2-inch</u>
Developed by: <u>Miracle</u>		Dev. Rig (Y/N)

Dev. Method: Pump 3-5 volumes with measured reading being within
± 10% for 3 consecutive readings.

1 volume - 2.5 gal.

Equipment: Grundfos II Pump & Converter, 1/2-inch poly tubing &
Generator.

Pre-Dev. SWL: 90.71' TBC Maximum drawdown during pumping: N/A ft at N/A gpm

Range and Average Discharge rate: 2 gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: ~ 60 gal.

Disposition of discharge water:

1530 - Started Pump. Pumping 50 gal. added during installation before developing.

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
1558	-2.5	N/A	N/A	Dirty/Clr	15.5	6.2	310	Water has strong fuel odor.
1600	-2.5	N/A	N/A	Clear	14.3	6.0	229	
1602	-2.5	N/A	N/A	Clear	14.4	6.02	225	
1605	-2.5	N/A	N/A	Clear	14.1	5.9	222	

BORING LOG	BORING/WELL NO.: WT-17	Page 1 of 1
Installation: MMR		Site: FS-12, Greenway Rd
Project No.: 9750, Rev. 3.29		Client/Project: HAZWRAP / MMR
HAZWRAP Contractor:		Drill Contractor: BEI
Drill Started: 9/10/93 (09:10 A.M.)		Driller: A. Banto-Mo
Drill Ended: 9/11/93 (11:00 A.M.)		Borehole dia(s): 7.25-inch
Drill Method/Rig Type: CME-9S, 4.25-inch ID HSA		Auger OD
Logged by: G. Maynor		E-Log (Y (N)) From _____ to _____
		Protection Level: D

Depth (ft)	Sample No.	Lab Anal (Y/N)	Recovery (%)	Lithologic Description	USCS	Blows / 6 inch	Graphic Log	Well data	Water depth & Remarks	Elev
14	0			*No samples. cuttings only.	SW					
28	0			0-30(?) Sand and Gravel, @ 1 ft. brn, well graded sand w/ some silt, well	SP				QA/QC: ER-091193-1 FB-091193-1-P FB-091193-2-P TB-091193-1	
42	0			graded gravel (pec to cobbles), tr. moist. loose. SW	SP					
56	0			30-70 Sand, lt. brn. dom. med. grn. w/ well graded gravel (5-15%), tr. moist. loose	SP					
70	0.15			Sand, lt. brn. dom. med. grained, w/ well graded gravel (15-20%), tr. moist. loose (5-15%)	SP			Bact.		
	9.4			Sand, as above.	SP			Bact. BTEX T&C TPH	WT-17-742D-091193	
-75	5.4			Sand, as above.	SP			Bact.		
	5.7			Sand, as above.	SP			Bact.		
	1.3			Sand, as above.	SP			Bact.		
80	2.2			Sand, as above w/ some coarse sand and gravel	SP			Bact.		
	4.6			Sand, as above - v. moist. - moist.	SP			Bact.		
85	20.2			Sand, as above. moist.	SP			Bact. BTEX TPH		
	12.5			Sand, as above. moist.	SP			Bact.		
	21.9			Sand, as above moist	SP			Bact. BTEX TPH		
90				Sand, as above. cuttings only.	SP				* wtr level 91.53 ft bgs 9/13/93.	
95										
97										
99										
101				* added 50 gal of wtr during drilling 90-105' on 9/12/93.						
103				TD 105'						
105										

U = Thin Wall Tube
S = Split spoon (tube)
2 x 24-inch
C = Cuttings

R = Rock Coring

O = Other

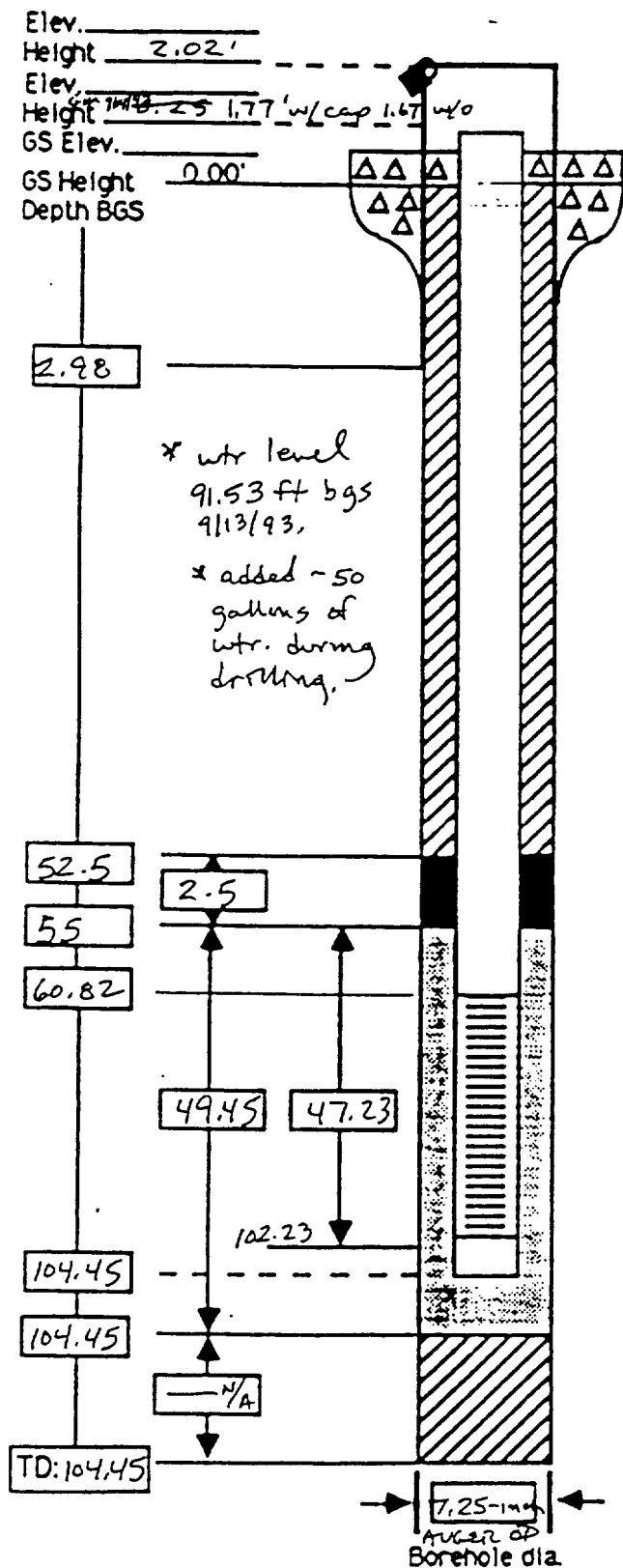
Notes:

Field G/C (Make/Mod.)

G/C Oper.:

* lt. brn. = Grayish orange 10 YR 7/4 to moderately yellowish Brown 10 YR 5/4 (Munsell)

MONITORING WELL CONSTRUCTION LOG -- Standard		
WELL NO.: WT-17	Installation: MMR	Site: FS-12
Project No.: 9150-K04.2	Client/Project: HAZWRAP/MMR	
HAZWRAP Contractor: ASI	Drig Contractor: BEI	
Comp. Start: 9/11/93 (10:40 A.M.)	Comp. End: 9/11/93 (~15:00 P.M.)	
Built By: G. Maynor (ASI), A. Bortolillo (BEI)		Well Coord: .



PROTECTIVE CSG

Material / Type 5-ft carbon steel

Diameter 0.6'

Depth BGS 2.98'

Weep Hole (Y/N)

GUARD POSTS

No. 4 Type Carbon steel w/ concrete

SURFACE PAD

Composition & Size 2x2 ft x 4+ inch concrete

RISER PIPE

Type Schedule 80 PVC (Bedrock)

Diameter 2-inch

Total Length (TOC to TOS) 42.49'

Ventilated Cap (Y/N)

GROUT Volclay Grout

Composition & Proportions 5.5 sacks (50 lbs) w/ ~130 gal potable wtr.

Tremled (Y/N)

Interval BGS surface to 52.5' bgs

CENTRALIZERS

(Y/N) N/A

SEAL

Type 4-inch Bentonite Pellets, 1.5 buckets (5' w/ 14' source)

Source Peltonite / BEI

Setup/Hydration time 0.5 hr. Vol. Fluid Added 10 gal w/

Tremled (Y/N)

FILTER PACK 55-104.45'

Type Moric #1 Mesh Silica

Amt. Used 10 sacks (100 lbs)

Tremled (Y/N) sack

Source Moric / BEI

Gr. Size Dist. medium to coarse

SCREEN (41.41')

Type stainless steel (Johnson)

Diameter 2-inch

Slot Size & Type 0.01-inch

Interval BGS 60.82-102.23

SUMP (Y/N) (1.99')

Interval BGS 102.23-104.22' Length 1.99'

Bottom Cap (Y/N) (0.23) 104.22-104.45'

BACKFILL PLUG

Material N/A

Setup/Hydration time N/A

Tremled (Y/N) N/A



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WELL DEVELOPMENT LOG		WELL NO: WT-17
Installation: MMR		Site: FS-12
Project No. 9750.K04.J.09		
Dev. Start: 9-13-93/0855	Dev. End: 9-13-93 / 1400-0928	Csq Dia: 2"
Developed by: Miral Le		Dev. Rig (Y/N)

Dev. Method: Pump 3 to 5 volumes with measured parameters being within $\pm 10\%$ for 3 consecutive volumes. 1 volume = 2 gal

Equipment: 2-inch Grundfos Pump & Converter. 1/2" poly tubing.

Pre-Dev. SWL: 93.30' Maximum drawdown during pumping: N/A ft at N/A gpm

Range and Average Discharge rate: 2 gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: ~ 60 gal.

Disposition of discharge water:

0855. Started Pump - Pumps 50 gal. added during installation, before developing.

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
0922	~ 2	N/A	N/A	Clear	5.4	14.5	198	
0924	~ 2	N/A	N/A	Clear	5.5	13.7	170	
0925	~ 2	N/A	N/A	Clear	5.6	13.5	168	
0926	~ 2	N/A	N/A	Clear	5.7	13.5	169	

BORING LOG BORING/WELL NO.: WT-19 Fieldbook # MMR 34 REV. DATE: MAY 1991
 Installation: MMR Page 1 of 1
 Project No.: 9750.R04.3 Client/Project: HAZWRAP/MMR Site: FS-12
 HAZWRAP Contractor: Dril Contractor: Driller: A. Boufoille
 Dril Started: 9/12/93 (17:16 Pm) Dril Ended: 9/12/93 (18:59 Am) Borehole dia(s): 7.25-inch
 Dril Method/Rig Type: CME-95 w/ 4.25-inch HSA (LSD) Auger OD
 Logged by: G. Maynor E-Log (Y/N) From to Protection Level: D

Depth (ft)	Sample No.	Sample Lab Anal. (Y/N)	Recovery (%)	Lithologic Description	USCS	Blows/6 inch	Graphic Log	Well data	Water depth	Remarks
14				No samples cuttings only.	\$W					
28				0-20(?) Sand and Gravel, lt. brown, well graded sand w/ some silt, well graded gravel (pea to cobble)	\$P	N/A				
42				20?-70 Sand, lt. brn., dom. med. grained w/ tr. moisture, loose. (SW) other well graded gravel (15%) w/ tr. moisture to moist, loose. (SP)	\$P					
54				NO SAMPLE, AS Above; cuttings	\$P					PM/RC TB-9893-1
70				Sand, lt. brn., dom. med. grained w/ tr. moisture, loose. (SW) AS Above.	\$P					
75				AS Above.	\$P					
				AS Above.	\$P					
				AS Above, w some gray fine sand in upper 0.4.	\$P					
80				AS Above w/out fine gray sand.	\$P					
				AS Above w/ tr. fine gray sand	\$P					BTEX TPH TOC
85				AS Above.	\$P					
				AS Above w/ tr. fine gray sand.	\$P					BTEX TPH TOC
90				AS Above	\$P					
92				AS Above. odor.	\$P					BTEX TPH TOC
94										
96										
98										
100				Sand, AS Above (?)	\$P					* wtr. level 93.7 ft bgs. 9/14/93
102				TD 103 ft bgs.						
103				so added ~ 90 gal of wtr during drilling.						TD 103'

U = Thin Wall Tube
 S = Split spoon (tube)
 C = Cuttings

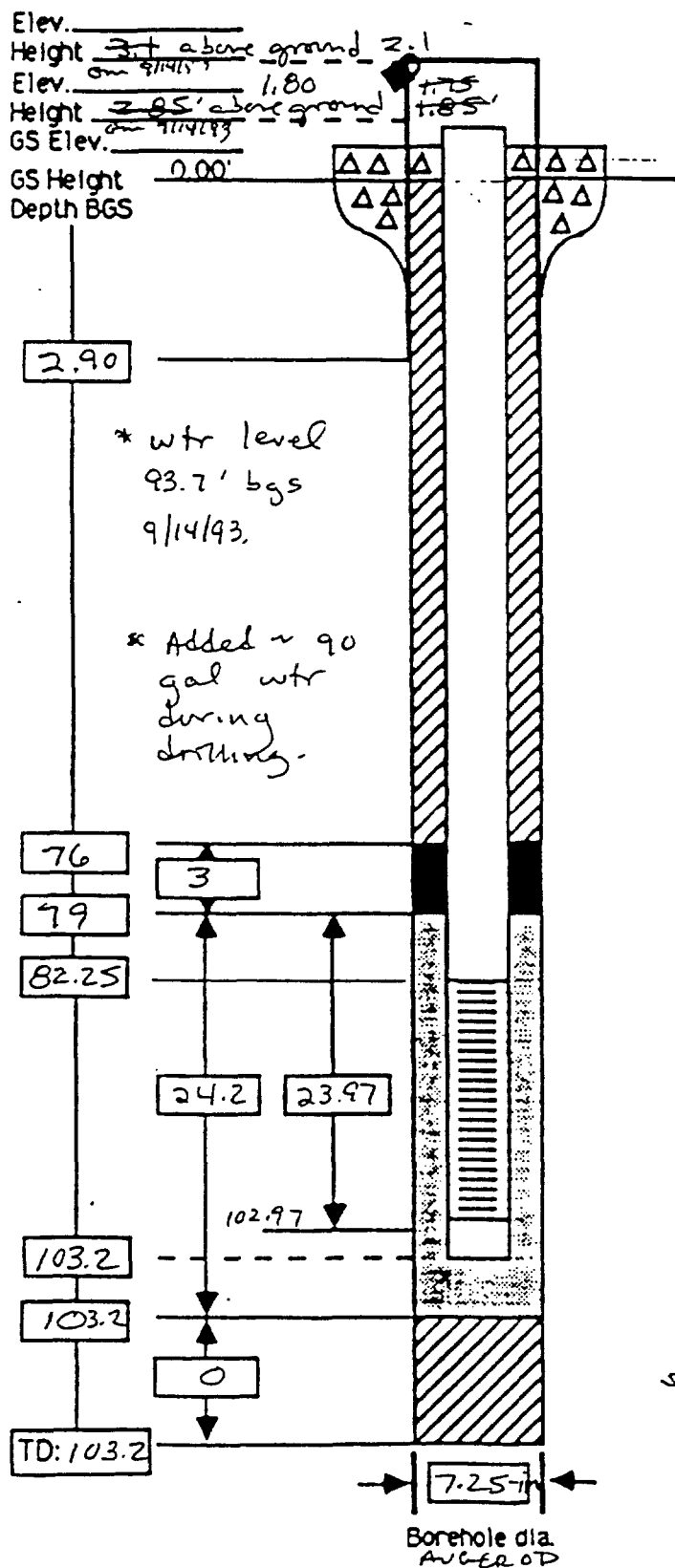
R = Rock Coring
 O = Other
 Notes:

Field G/C (Make/Mod.)
 G/C Oper.:

@ lt. brn. = Grayish Orange 10 YR 7/4 to moderately Yellowish Brown 10 YR 5/4 (Munsell Chart).

MONITORING WELL CONSTRUCTION LOG -- Standard

WELL NO.: WT-19	Installation: MMR	Site: FJ-12
Project No.: 9750-404	Client/Project: HAZWRAP/MMR	Greenway Rd
HAZWRAP Contractor: ASI	Drig Contractor: BEI	
Comp. Start: 9/13/93 (11:00 A.M.)	Comp. End: 9/13/93 (16:32 P.M.)	
Built By: G. Maynor (ASI), A. Bortolite (BEI)		Well Coord.: _____



PROTECTIVE CSG

Material / Type 5-ft carbon steel
 Diameter 0.75 on 9/14/93 0.6'
 Depth BGS 2.90 Weep Hole (Y/N)

GUARD POSTS

(Y/N)
 No. 4 Type carbon steel w/ concrete

SURFACE PAD

Composition & Size 2 x 2 ft x 4+ inch concrete

RISER PIPE

Type Schedule 80 PVC (Bedrock)
 Diameter 2-inch
 Total Length (TOC to TOS) 24.27 24.10 to 84.0
 Ventilated Cap (Y/N) on 9/14/93 on 9/14/93

GROUT

Volclay Grout
 Composition & Proportions 6 (50 lb.) sacks of volclay w/ ~175 gal wtr
 Tremied (Y/N)
 Interval BGS surface - 76'

CENTRALIZERS

(Y/N) N/A

SEAL

76-79' (50 lbs/bkt.)
 Type 4-inch Bentrinite Pellets, 1.5 Buckets
 Source Peltonite / BEI
 Setup/Hydration time 0.5+ hr. Vol. Fluid Added 10 gal
 Tremied (Y/N)

FILTER PACK

79-103' TD
 Type Monie #1 mesh silica
 Amt. Used 6 (100 lb) sacks
 Tremied (Y/N)
 Source Monie / BEI
 Gr. Size Dist medium to coarse

SCREEN

82.25-102.97
 Type Stainless steel (Johnson)
 Diameter 2-inch
 Slot Size & Type 0.01-inch, continuous
 Interval BGS _____

SUMP

(Y/N) N/A Length N/A
 Interval BGS N/A
 Bottom Cap (Y/N) 102.97 - 103.2

BACKFILL PLUG

Material N/A
 Setup/Hydration time N/A
 Tremied (Y/N) N/A



ADVANCED SCIENCES, INC.

Fieldbook : mmr # 34

WELL DEVELOPMENT LOG		WELL NO: WT-19
Installation: WMT2		Site: Greenway ²
Project No. 97Sc-K04.3.09		FS-12
Dev. Start: 9/14/93 0748	Dev. End: 9/14/93 0903	Csq Dia: 2-inch
Developed by: G. Maynor (ASI), Walt Ketter (BEI)		Dev. Rig (Y(N))

Dev. Method: 2-inch electric submersible pump (Grundfos) w/ 1/2-inch polyethylene tubing. Purge 3-5 well volumes (plus wtr. added) and until sediment-free and measured parameters within 10% on 3 consecutive readings.

Equipment: TD 103.02 - 93.70 = 9.32' wtr column x 0.16 gal/ft = 1.5 gal/well volume x 3 = 4.5 gal + 90 gal (added dr. m) = ~95 gal.

Pre-Dev. SWL: 93.7' bgs Maximum drawdown during pumping: N/A ft at N/A gpm

Range and Average Discharge rate: 1.5 gal/min gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: ~103 gal, clear (slight tint) w/ odor.

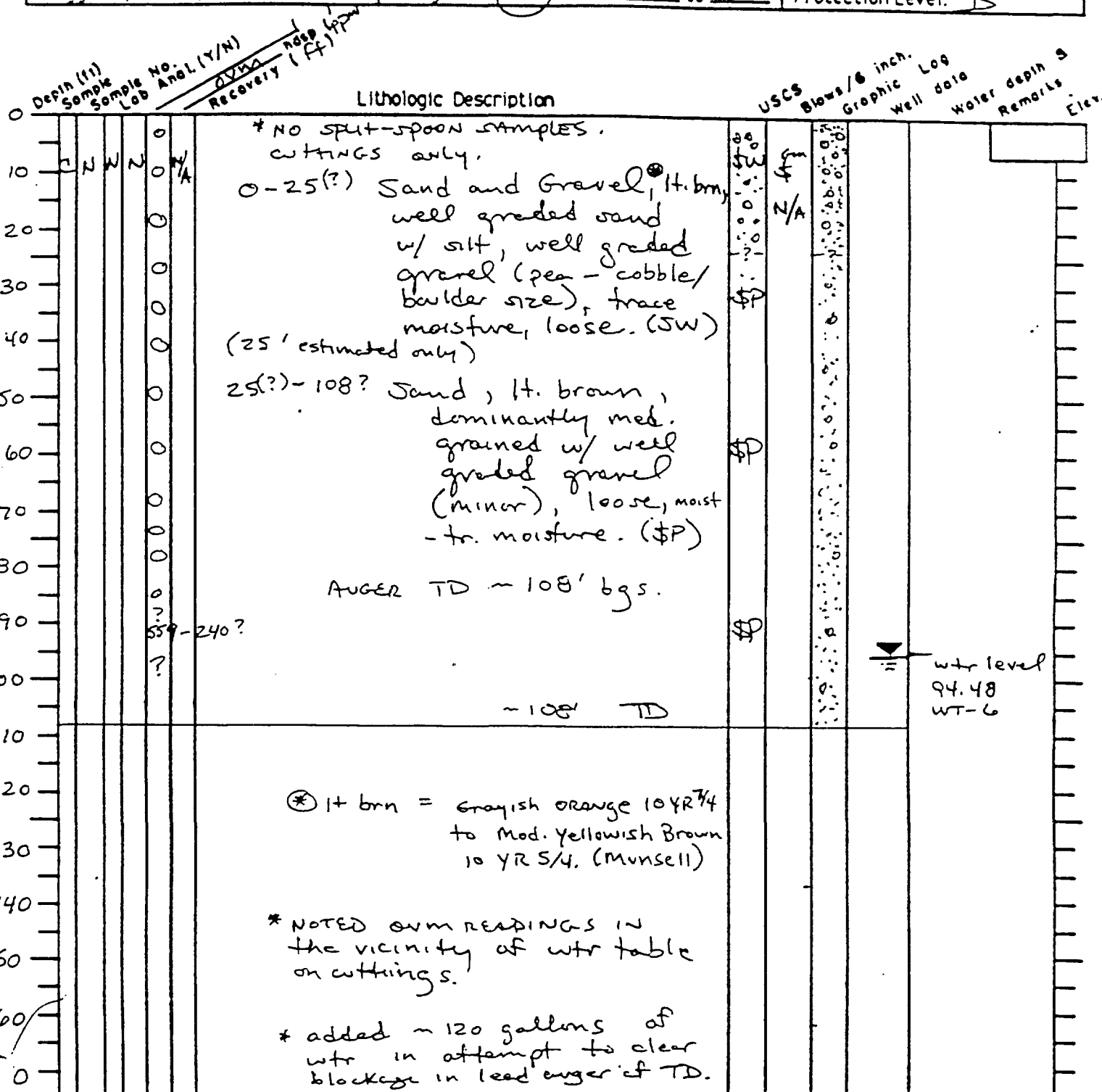
Disposition of discharge water: clear/sli. tint w/ odor, HC vapors 1.6 - 9 ppm in dr.

* Lower pump initially to ~97 ft bgs.

* 0748 Start pump - wtr very brown tinted. Clears to milky after ~10 gal. Hydrocarbon odor. 0818 after ~

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
0748	Start	Pump	(set ~	97 ft)				
0818	lower	pump to ~100	ft.	pumped 40+ gal.				wtr stays clear.
0830	lower	pump to TD (103.2)		pumped 40+ gal.				wtr stays "clear"
0855	~90	N/A	none	clear.	15.7	5.51	161	
0858	~94.5	N/A	"	faint tint.	15.0	5.55	150	
0901	~99	N/A	"	"	15.0	5.56	146	
0903	~103 gal end purge.							

BORING LOG		BORING/WELL NO.: AS-1 WT-20		Date: 8/16/93 Page 1 of 1	
Installation: AS-1 8/16/93 MMR		Site: AS-1 Greenway Rd. Area		UT-20	
Project No.: 9750.K04309		Client/Project: HAZWRAP / MMR		UT-20	
HAZWRAP Contractor: ASI		Drill Contractor: BEI		Driller: Dan Gotto	
Drill Started: 8/16/93 (0935 A.M.)		Drill Ended: 8/16/93 (10:45 A.M.)		Borehole dia(s): 7.25-inch	
Drill Method/Rig Type: CME-75 Hollow Stem AUGERS (4.25-inch ID)				AUGER TD	
Logged by: GM, MM		E-Log (Y/N) From to		Protection Level: D	



U = Thin Wall Tube
S = Split spoon (tube)

R = Rock Coring
O = Other

Field G/C (Make/Mod.)

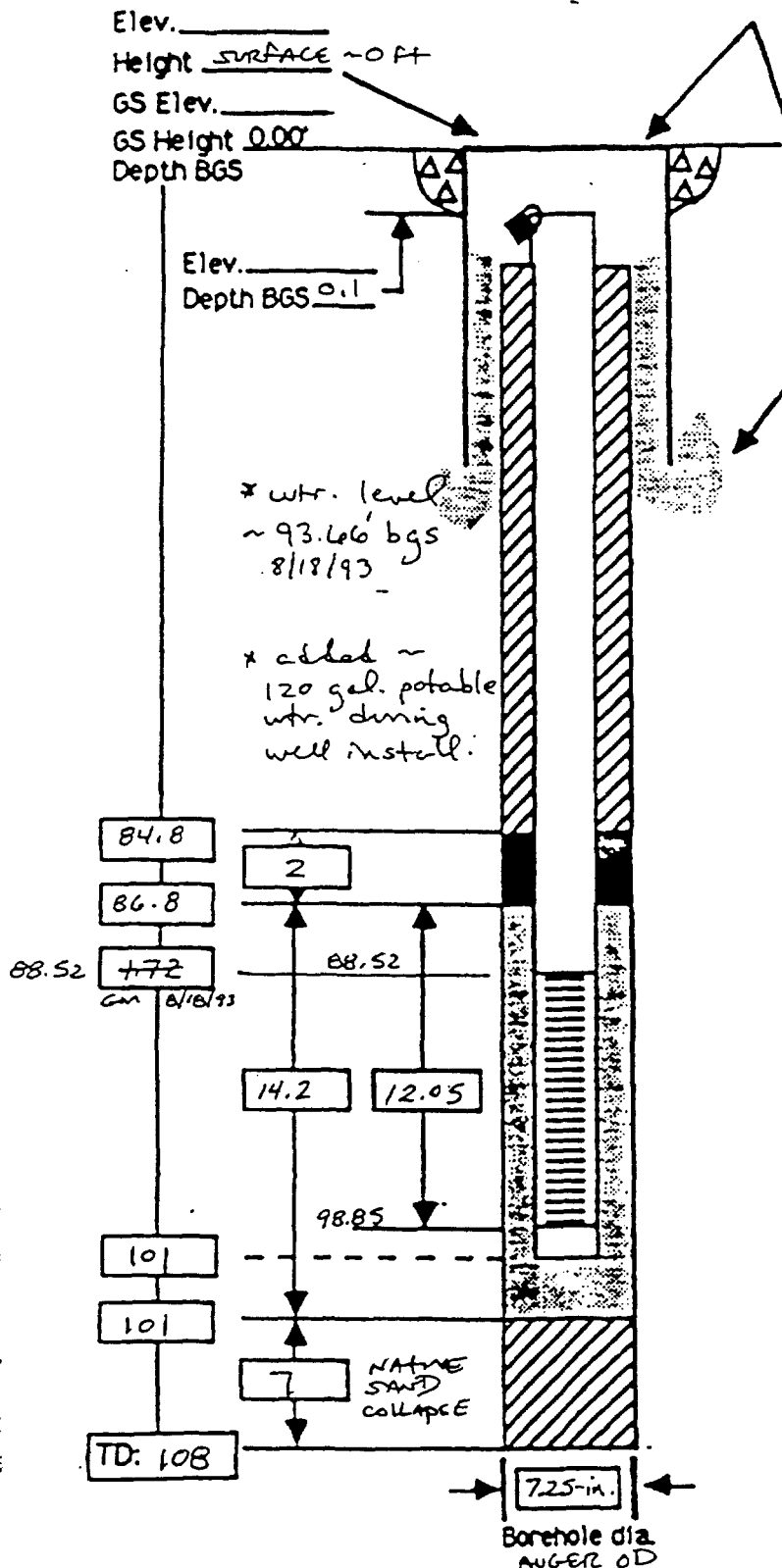
G/C Oper.:

C = Cuttings

Notes:

MONITORING WELL CONSTRUCTION LOG -- Standard Flush Mount

WELL NO.: WT-20	Installation MMR	Site: WT-20
Project No.: 9750. K4.32	Client/Project: HAZWRAP / MMR	
HAZWRAP Contractor: ASI	Drig Contractor: BET	
Comp. Start: 8/16/93 (16:35 P.m)	Comp. End: 8/17/93 (12:45 P.m)	
Built By: BEI (D. Gatto), ASI (MM, GM)	Well Coord: .	



PROTECTIVE CSG

Material / Type metal flushmount 1.5 ft
 Diameter 0.75
 Depth BGS ~1.5 ft cement w/ 3 sks cement
 Watertight O-Ring (Y/N)

SURFACE PAD

~12x12 ft "Down Patch"
 Composition & Size 2 ft x 2 ft x 4 in. cement
 Breathes With Vadose Zone (Y/N) 3 lbs Sakrete
 80 lbs/bag and
 potable w.

RISER PIPE

Type Schedule 80 PVC
 Diameter 2-inch
 Total Length (TOC to TOS) surface to 88.52 (eq.)
 Ventilated Cap (Y/N) (0.1) GM 8/21/93

GROUT cement/Bentonite

Composition & Proportions 14 sks (94 lb/sk) Portland
 Type I/II cement / 3.25 sks (54 lb/sk) Bentonite Powder
 Tremied (Y/N) with ~200-220 gal potable w.
 Interval BGS surface - 84.8'

CENTRALIZERS (Y/N)

Depth(s) N/A

SEAL

Type Bentonite Pellets (1/2-inch) 1.5 BxTs (54 lb/sk)
 Source "BAROID" (BEI)
 Setup/Hydration time 0.5 hr Vol. Fluid Added 5+ gal
 Tremied (Y/N) 84.8-86.8 potable w.

FILTER PACK

Type Morrie #1 Mesh Silica 86.8-101'
 Amt. Used 6.75 sks (100 lbs/sk)
 Tremied (Y/N)
 Source Morrie (BEI)
 Gr. Size Dist. med/coarse

SCREEN

Type stainless steel (Johnson Thread)
 Diameter 2-inch
 Slot Size & Type 0.01 slot continuous
 Interval BGS 88.52-98.85

SUMP

(Y/N) 98.85-101' Length 2.15
 Interval BGS
 Bottom Cap (Y/N) N/A welded upside
 down to sump

BACKFILL PLUG 101-108'

Material NATIVE SAND COLLAPSE
 Setup/Hydration time N/A
 Tremied (Y/N)

GKM

Recorded by: R. Hekstra

[illegible]

Date: 8/26/93

Test No.: 1

Recorded by: R. Hoekstra

AIR SPARGING - AIR SAMPLES FOR GC ANALYSIS

[illegible]

The samples will be numbered with well no. first, followed by the sample no. from that well (ie. OW-3-1, OW-4-2, etc.) Each sample bag will have the sample number, the date and the time the sample was taken written on the tedlar bag.



ADVANCED SCIENCES, INC.

Fieldlog: MMR Book #32

WELL DEVELOPMENT LOG		WELL NO: WT-20
Installation: MMR		Site: Greenway Rd.
Project No. 9750.K04.3.09		
Dev. Start: 8/22/93	Dev. End: 8/22/93	Csq Dia: 2-inch
Developed by:		Dev. Rig (Y(N))

Dev. Method: 2-inch electric submersible pump (Grundfos) w/ 1/2-inch polyethylene tubing. Purge 3-5 well volumes. 1/2 until sediment free and measured parameters are within 10% on 3 consecutive readings. Lower/purge over 3-5' sections of screen.

Equipment: see above.

$$TD \ 101' (bgs) - 93.55' (bgs) = 7.45 \text{ ft} \times 0.16 \frac{\text{gal}}{\text{ft}} = 1.25 \text{ gal}$$

$$\text{minimum purge} = 3 \times 7.45 + 120 \text{ gal} = 126 \text{ gal}$$

Pre-Dev. SWL: 93.55' Maximum drawdown during pumping: N/A ft at N/A gpm

Range and Average Discharge rate: 1.5 - 2.5 gal/min. gpm

Total quantity of material bailed: N/A

Total quantity of water discharged by pumping: 127 gal

Disposition of discharge water: Faint tint/clear w/ notable HC odor. 1.7-15 ppm OHM

1432-1434 started pump, pumped ~4 gal rusty, brn. wtr. - pump cut off. pump set ~ 97-98'.

1438 RESTART pump. < 1 gal/min.

Time	Volume Removed (gals)	Water Level ft. BTOC	Turbidity	Clarity/Color	Temp °C	pH	Conductivity	Remarks
1600	120	N/A	NONE	fnt. tint/clear	14.9	5.78	115	
1603	123	N/A	NONE	fnt. tint/clear	14.4	5.66	112	
1606	126	N/A	NONE	fnt. tint/clear	14.1	5.6	112	
1608	stopped							purge ~ 127 gal total.

Glen F. MONWELL

APPENDIX B

AIR SPARGING FIELD LOGS
DO READINGS
AIR READINGS
AIR SAMPLES
OPERATING PARAMETERS
AND
ASSOCIATED GRAPHS

-Recorded by: RHOEKSTRA

AIR SPARGING - OPERATING PARAMETERS

[illegible]

* Adjusted flow back to 50 acfm

Date: 8-26-93

Test No.: A5-1

Recorded by: MM

50 CFM
AIR SPARGING - DO READINGS

[illegible]

Recorded by: Vel

AIR SPARGING - OPERATING PARAMETERS

[illegible]

Date: 8-27-53

Test No.: 45-2

Recorded by: MM

AIR SPARGING - DO READINGS

75 CFM

Well OW-3		Well OW-4		Well WT-6	
Time	DO	Time	DO	Time	DO
0826	6.2	0830	9.1	0833	4.0
0958	7.1	1001	8.8	1003	4.3
1101	8.2	1104	9.0	1106	4.0
1201	8.2	1204	8.6	1207	3.9
1258	8.2	1302	9.1	1305	3.7
1359	8.1	1402	9.6	1405	3.5
1459	7.8	1507	10.0	1600	4.3
1559	7.3	N/A	N/A	1618	2.9
17:19	7.3	N/A	N/A	17:15	4.0

Date: 8-27-93

Test No.: AS-2

Recorded by: Reh

AIR SPARGING - AIR READINGS - O₂ and CO₂

[illegible]

WATER Pump down & Assembly pulled from hole.

Recorded by: Reh

* WATER pump Down & Assembly pulled from hole.

Recorded by: mm

100 CFM
AIR SPARGING - DO READINGS

[illegible]

Recorded by: KE

AIR SPARGING - AIR READINGS - O₂ and CO₂

[illegible]

Recorded by: Del

The samples will be numbered with well no. first, followed by the sample no. from that well (ie. OW-3-1, OW-4-2, etc.) Each sample bag will have the sample number, the date and the time the sample was taken written on the tedlar bag.

Date: 8/29/93

Test No.: AS-4

Recorded by: Reh

AIR SPARGING - OPERATING PARAMETERS

[illegible]

* Removed Pressure Reducer to increase flow.

Date: 8/29/93

Test No.: AS-4

Recorded by: mm

112 C Fm
AIR SPARGING - DO READINGS

[illegible]

Recorded by: Reh

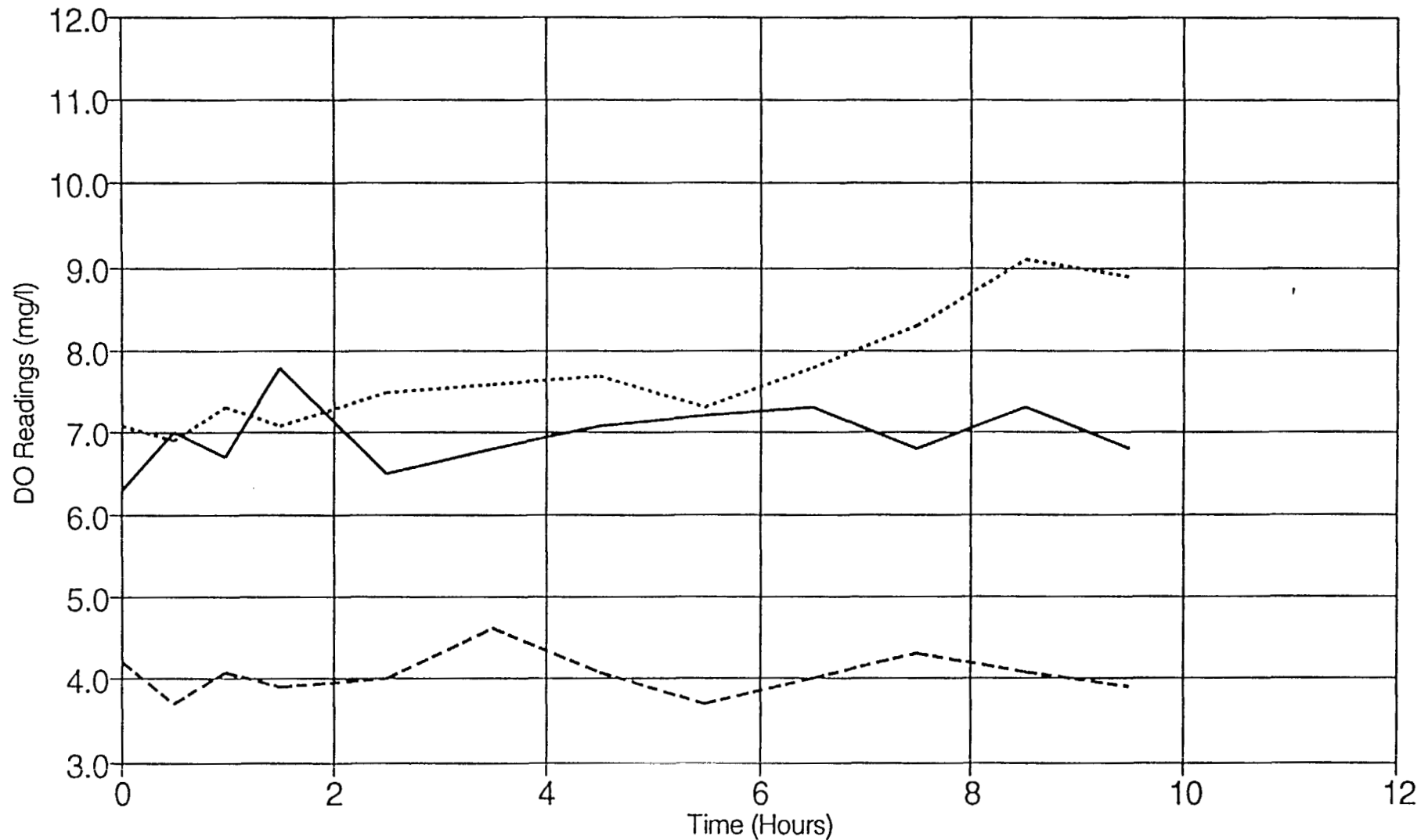
AIR SPARGING - AIR READINGS - O₂ and CO₂

[illegible]

Recorded by: Bel

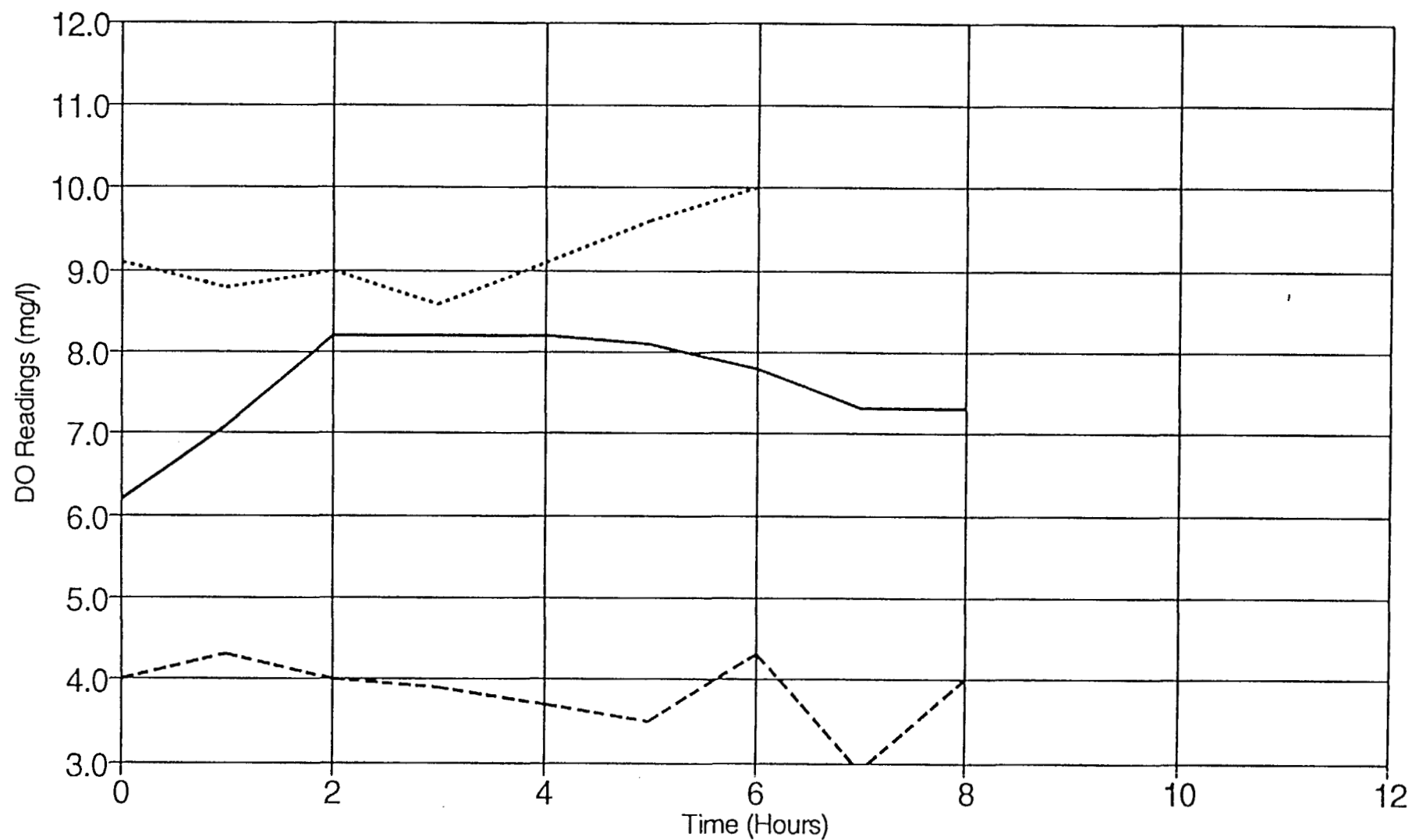
The samples will be numbered with well no. first, followed by the sample no. from that well (ie. OW-3-1, OW-4-2, etc.) Each sample bag will have the sample number, the date and the time the sample was taken written on the tedlar bag.

Figure B.1 Air Sparging Pilot Study
50 SCFM - DO Readings



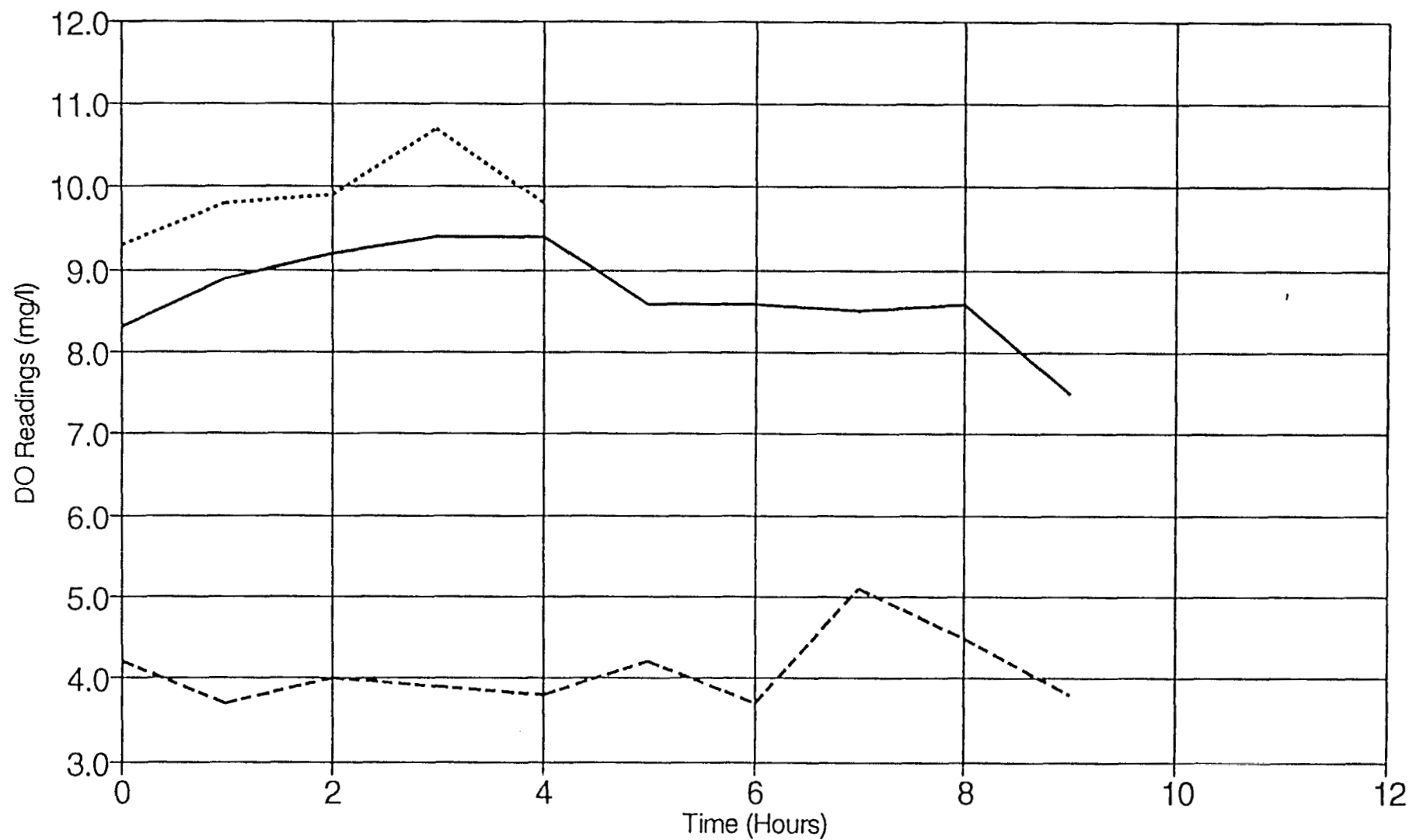
— OW-3 OW-4 ----- WT-6

Figure B.2 Air Sparging Pilot Study
75 SCFM - DO Readings



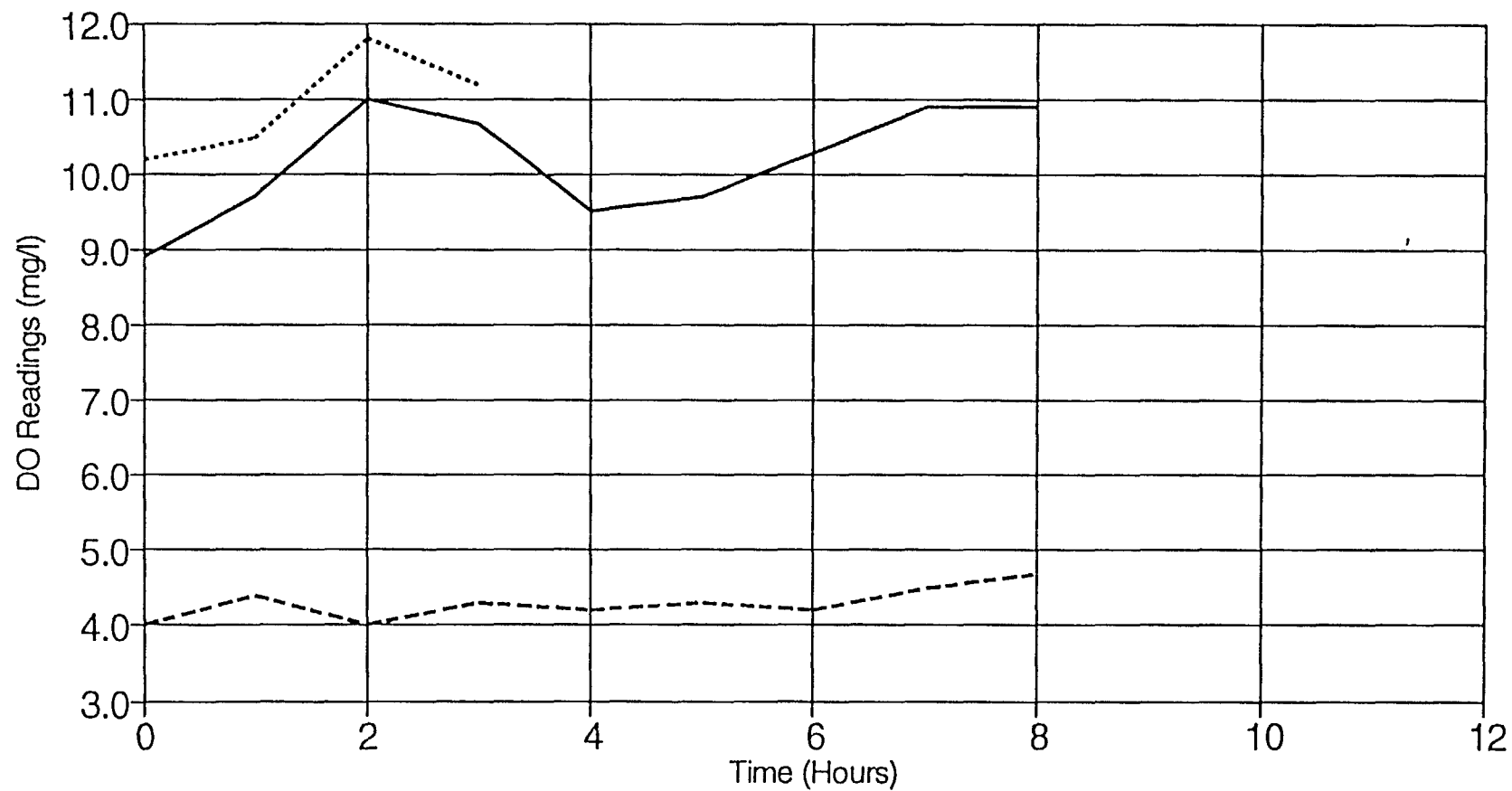
— OW-3 OW-4 - - - - WT-6

Figure B.3 Air Sparging Pilot Study
100 SCFM - DO Readings



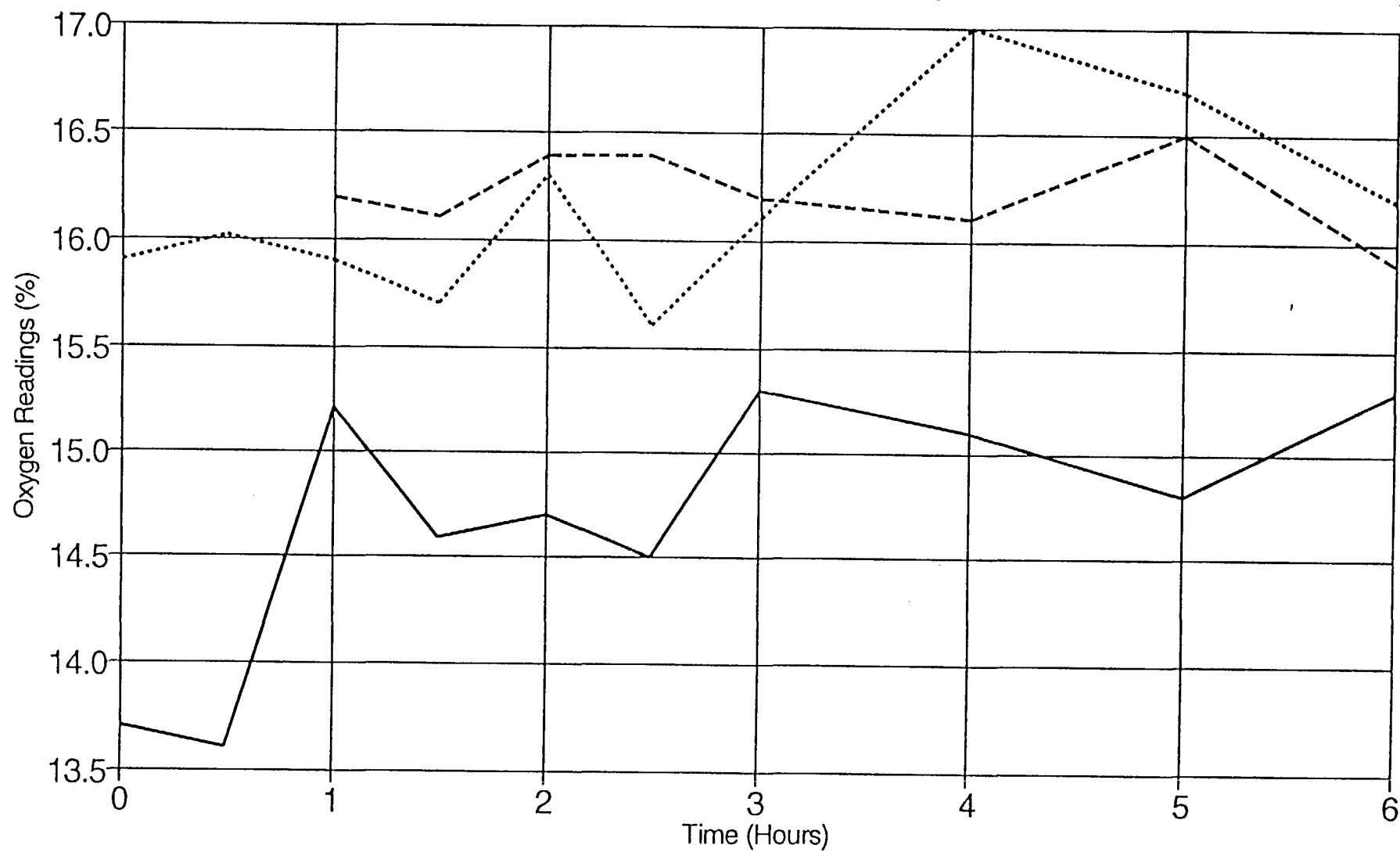
— OW-3 OW-4 ----- WT-6

Figure B.4 Air Sparging Pilot Study
115 SCFM - DO Readings



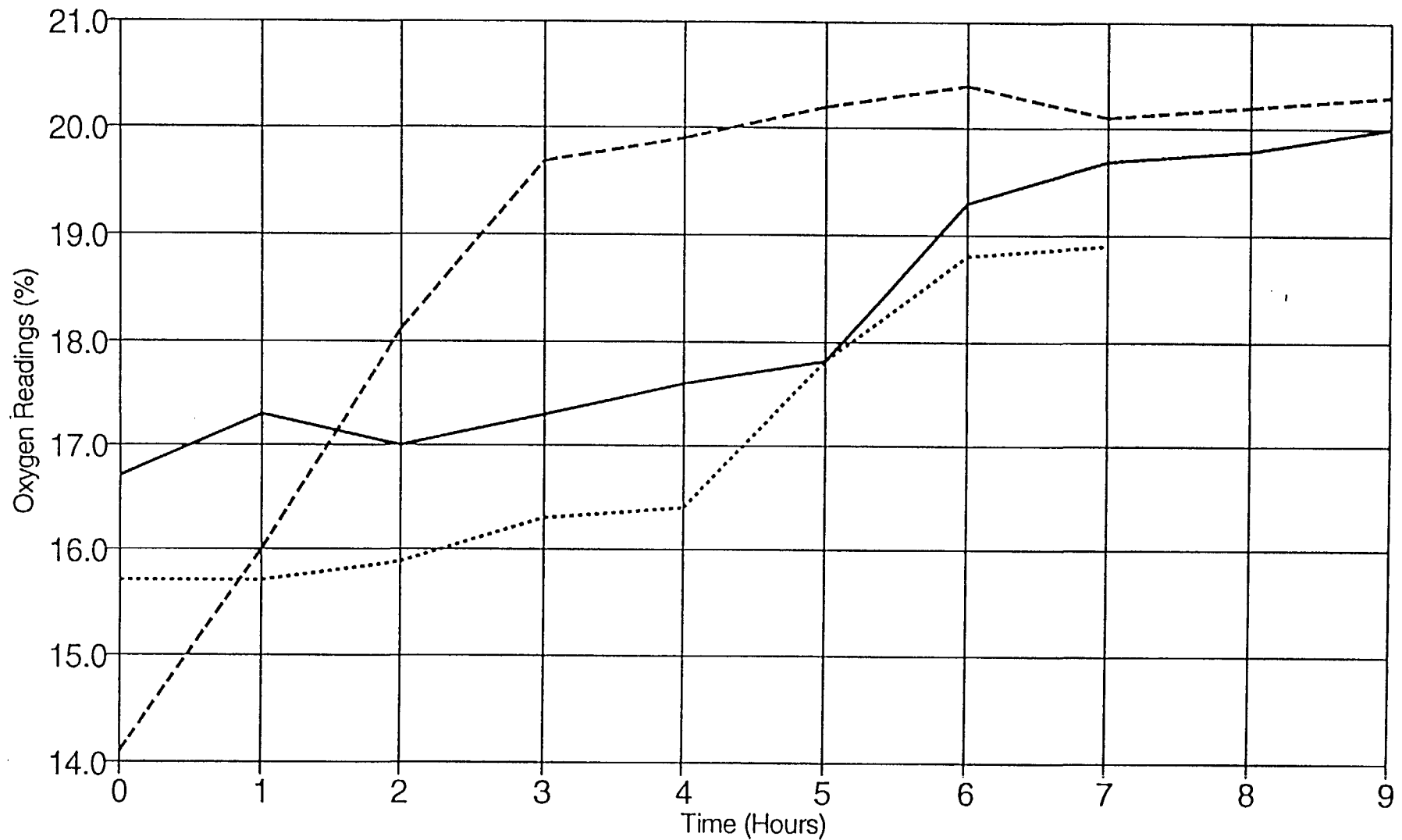
— OW-3 OW-4 ---- WT-6

Figure B.5 Air Sparging Pilot Study
50 SCFM - Oxygen Readings



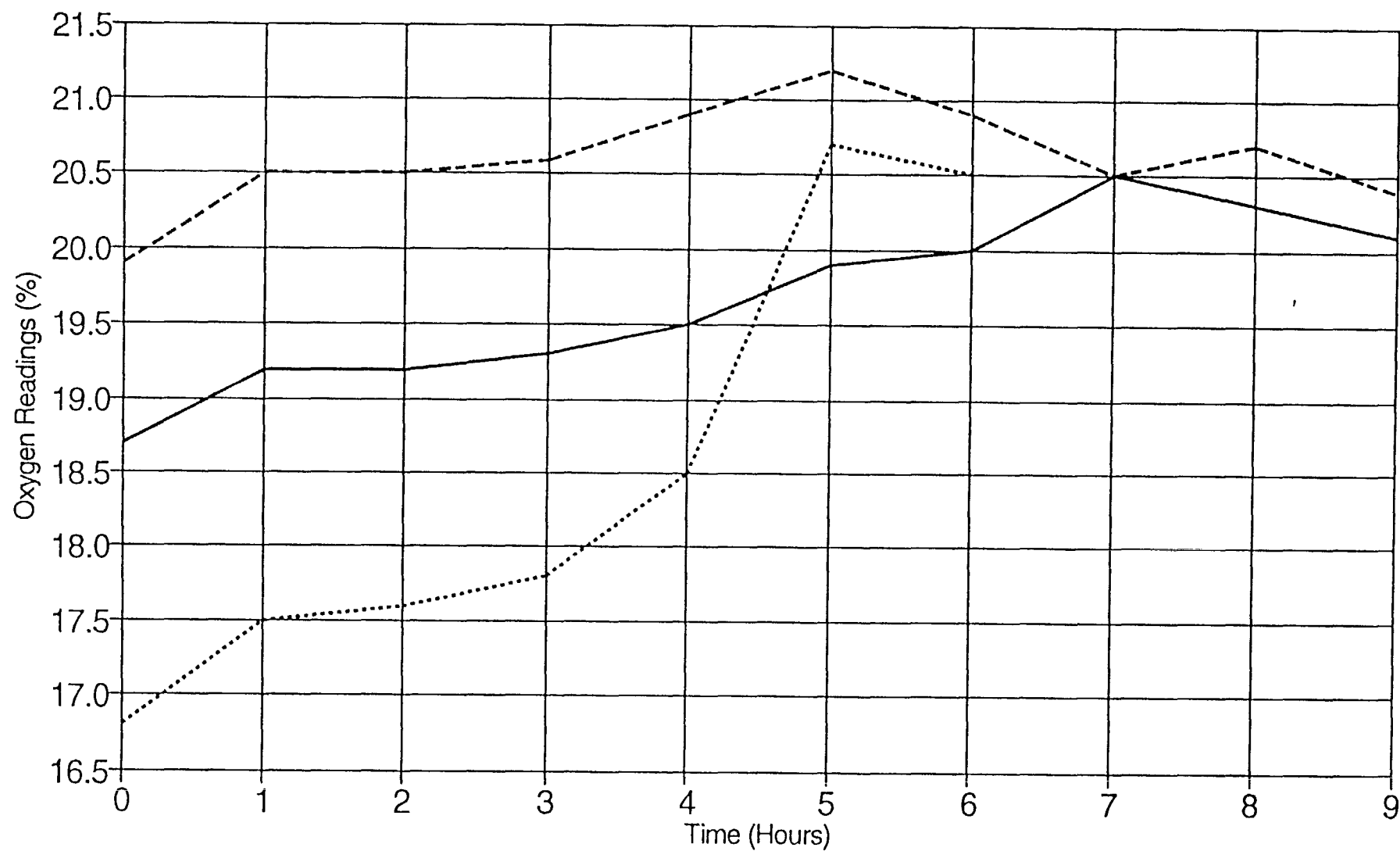
— OW-3 OW-4 ---- WT-6

Figure B.6 Air Sparging Pilot Study
75 SCFM - Oxygen Readings



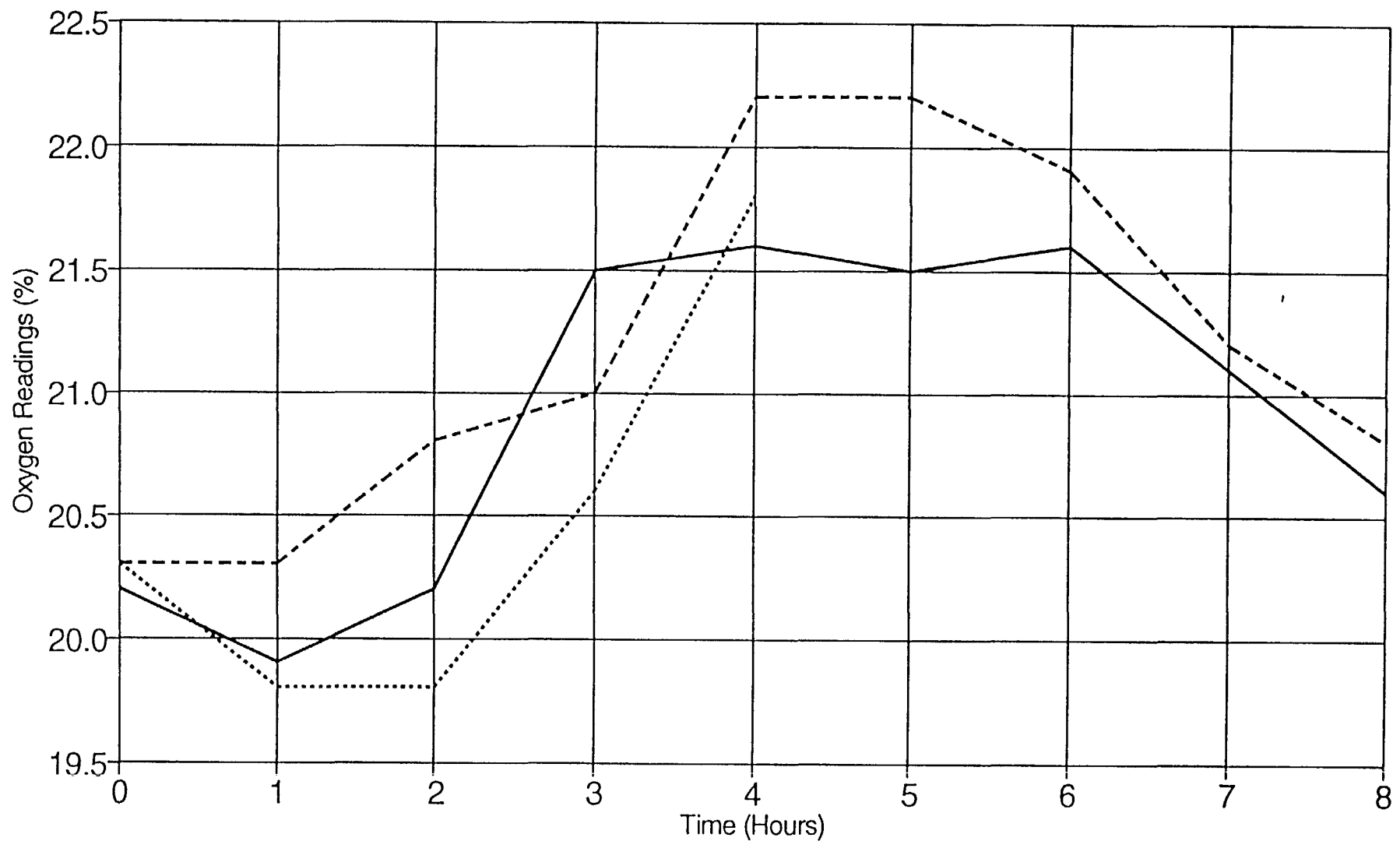
— OW-3 OW-4 - - - - WT-6

Figure B.7 Air Sparging Pilot Study
100 SCFM - Oxygen Readings



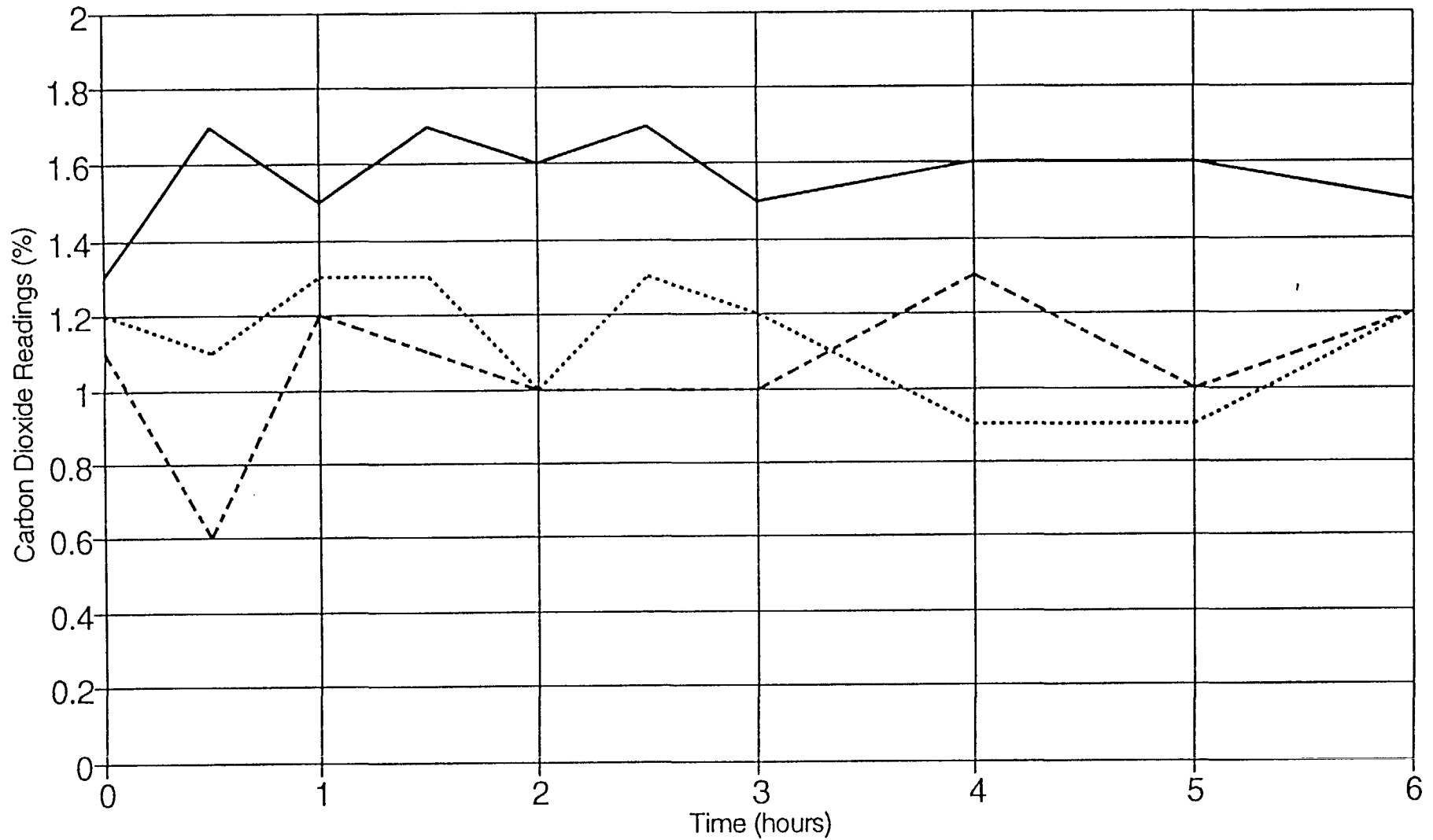
— OW-3 OW-4 ---- WT-6

Figure B.8 Air Sparging Pilot Study
115 SCFM - Oxygen Readings



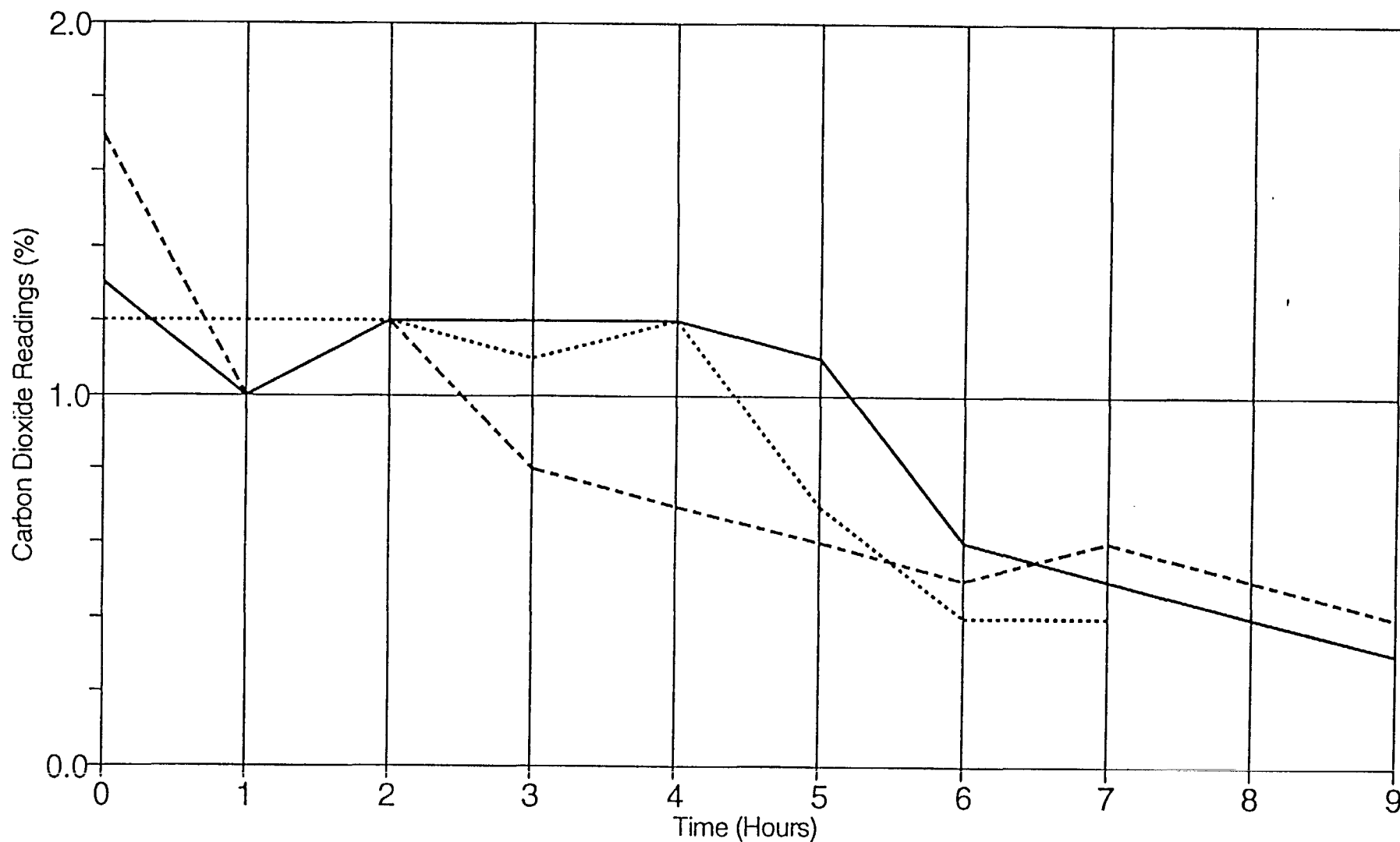
— OW-3 OW-4 ---- WT-6

Figure B.9 Air Sparging Pilot Study
50 ACFM - Carbon Dioxide Readings



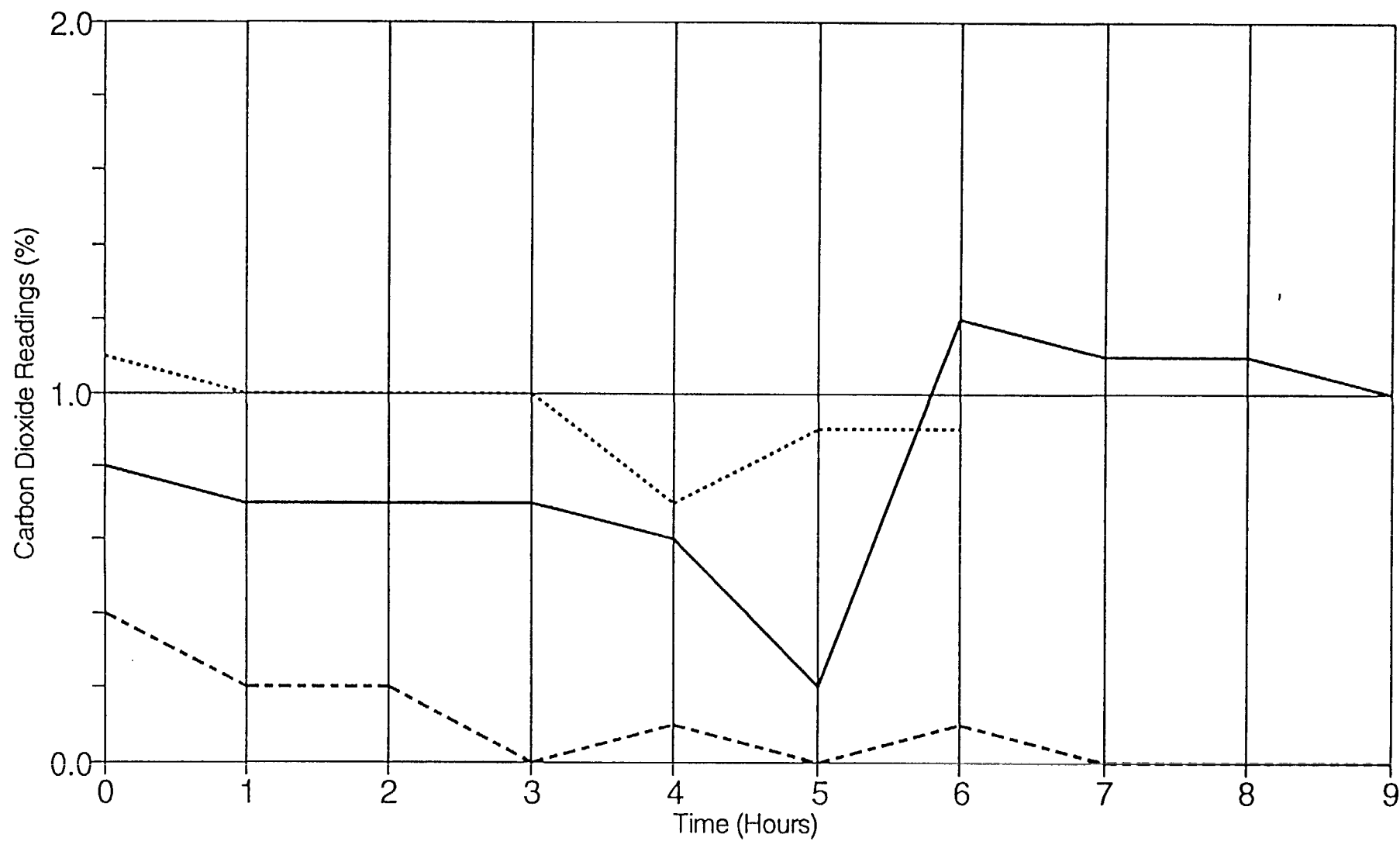
— OW-3 OW-4 ---- WT-6

Figure B.10 Air Sparging Pilot Study
75 SCFM - Carbon Dioxide Readings



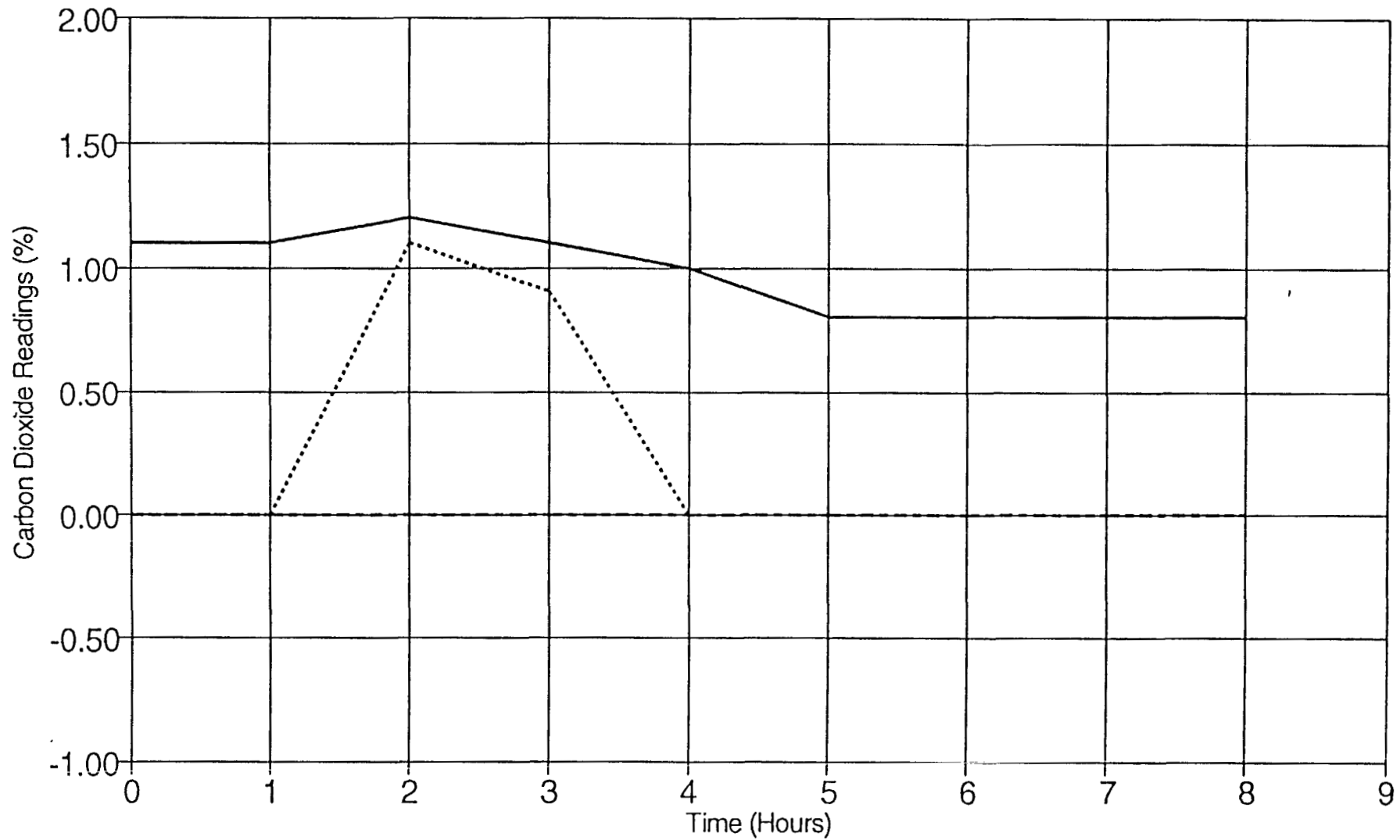
— OW-3 OW-4 ---- WT-6

Figure B.11 Air Sparging Pilot Study
100 SCFM - Carbon Dioxide Readings



— OW-3 OW-4 ----- WT-6

Figure B.12 Air Sparging Pilot Study
115 SCFM - Carbon Dioxide Readings



— OW-3 OW-4 ----- WT-6

APPENDIX C

AIR SPARGING PILOT STUDY
AIR PRESSURE DATA
WATER LEVEL DATA
AND
ASSOCIATED GRAPHS

Figure C1 - Air Sparging Pilot Study
50 SCFM Air Pressure Changes

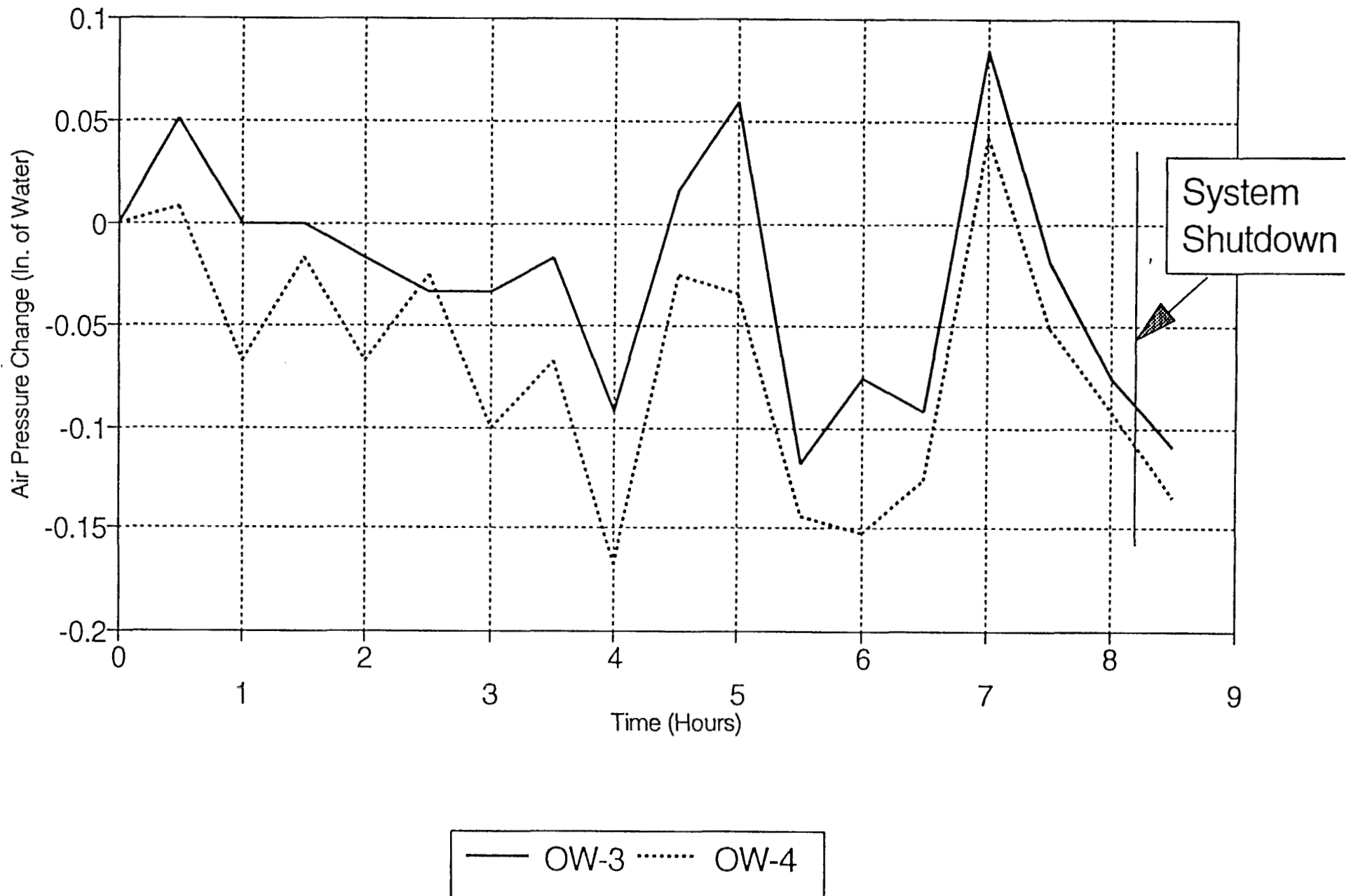


Table C1 - AS-1 50 cfm Air Pressure Changes

time Hour	Time seconds	OW-3 readin	OW-3 correcte	OW-4 readings	OW-4 corrected
0	0	1.0302	0	1.2329	0
0.5	1800	1.0809	0.0507	1.2413	0.0084
1	3600	1.0302	0	1.1653	-0.0676
1.5	5400	1.0302	0	1.216	-0.0169
2	7200	1.0133	-0.0169	1.1653	-0.0676
2.5	9000	0.99645	-0.03375	1.2076	-0.0253
3	10800	0.99645	-0.03375	1.1316	-0.1013
3.5	12600	1.0133	-0.0169	1.1653	-0.0676
4	14400	0.93734	-0.09286	1.064	-0.1689
4.5	16200	1.0471	0.0169	1.2076	-0.0253
5	18000	1.0893	0.0591	1.1991	-0.0338
5.5	19800	0.912	-0.1182	1.0893	-0.1436
6	21600	0.95423	-0.07597	1.0809	-0.152
6.5	23400	0.93734	-0.09286	1.1062	-0.1267
7	25200	1.1147	0.0845	1.2751	0.0422
7.5	27000	1.01133	-0.01887	1.1822	-0.0507
8	28800	0.95423	-0.07597	1.14	-0.0929
8.5	30600	0.92045	-0.10975	1.0978	-0.1351

Figure C2 - Air Sparging Pilot Study
75 SCFM Air Pressure Changes

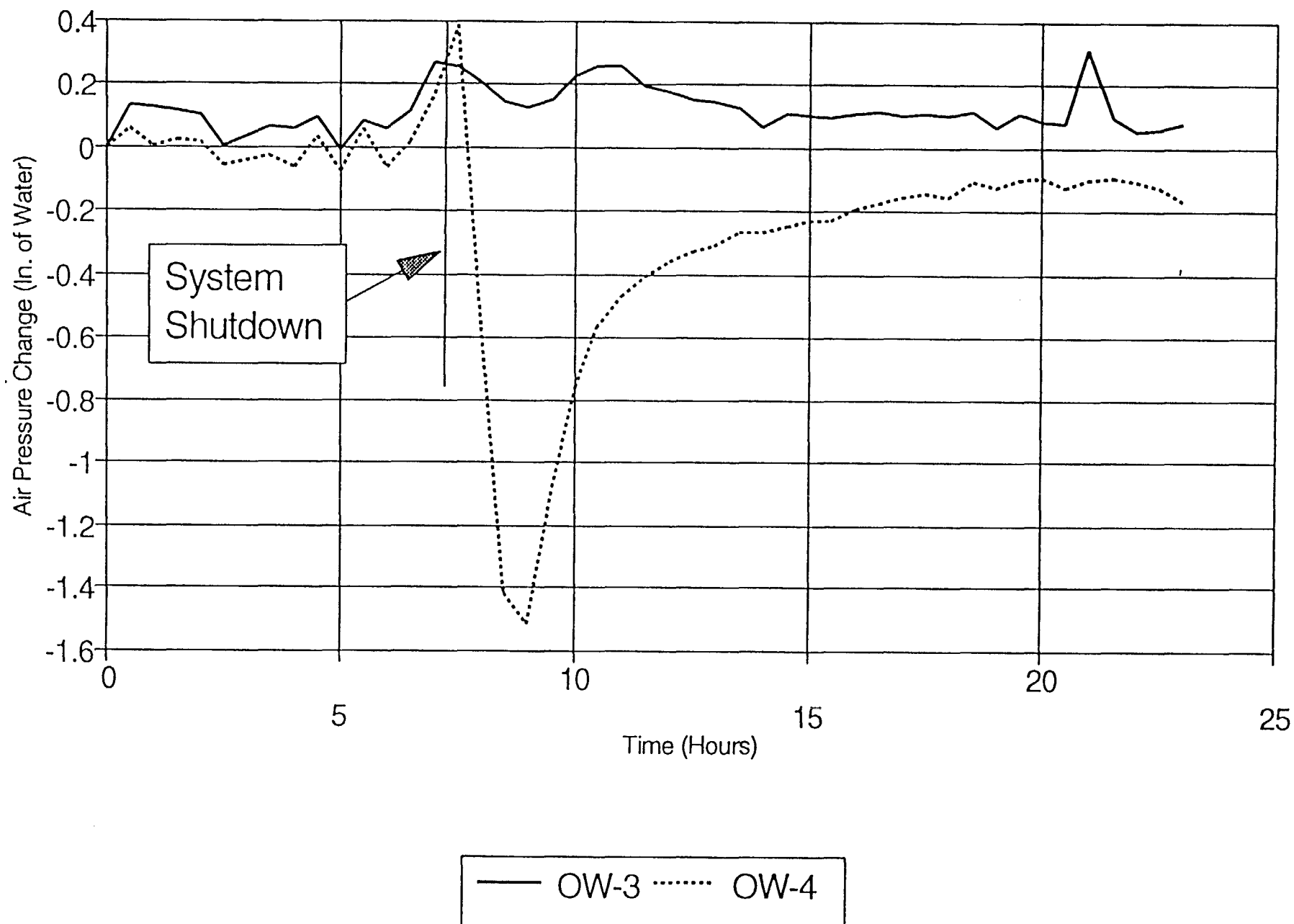


Table C2 - AS-2 75 cfm air pressure changes

time Hour	Time seconds	OW-3 reading	OW-3 correcte	OW-4 readings	OW-4 corrected
0	0	0.988	0	1.2413	0
0.5	1800	1.1231	0.1351	1.3004	0.0591
1	3600	1.1147	0.1267	1.2498	0.0085
1.5	5400	1.1062	0.1182	1.2667	0.0254
2	7200	1.0893	0.1013	1.2582	0.0169
2.5	9000	0.99645	0.00845	1.1822	-0.0591
3.5	12600	1.0556	0.0676	1.216	-0.0253
4	14400	1.0471	0.0591	1.1738	-0.0675
4.5	16200	1.0809	0.0929	1.2751	0.0338
5	18000	0.97956	-0.00844	1.1653	-0.076
5.5	19800	1.0724	0.0844	1.3004	0.0591
6	21600	1.0471	0.0591	1.1738	-0.0675
6.5	23400	1.1062	0.1182	1.2582	0.0169
7	25200	1.2582	0.2702	1.4102	0.1689
7.5	27000	1.2413	0.2533	1.6298	0.3885
8	28800	1.1991	0.2111	0.67556	-0.56574
8.5	30600	1.1316	0.1436	-0.17733	-1.41863
9	32400	1.1147	0.1267	-0.27867	-1.51997
9.5	34200	1.14	0.152	0.16044	-1.08086
10	36000	1.216	0.228	0.48133	-0.75997
10.5	37800	1.2413	0.2533	0.67556	-0.56574
11	39600	1.2413	0.2533	0.76845	-0.47285
11.5	41400	1.1822	0.1942	0.836	-0.4053
12	43200	1.1653	0.1773	0.87823	-0.36307
12.5	45000	1.14	0.152	0.912	-0.3293
13	46800	1.1316	0.1436	0.92889	-0.31241
13.5	48600	1.1147	0.1267	0.97111	-0.27019
14	50400	1.0556	0.0676	0.97111	-0.27019
14.5	52200	1.0978	0.1098	0.99645	-0.24485
15	54000	1.0893	0.1013	1.0133	-0.228
15.5	55800	1.0809	0.0929	1.0133	-0.228
16	57600	1.0978	0.1098	1.0471	-0.1942
16.5	59400	1.1062	0.1182	1.064	-0.1773
17	61200	1.0893	0.1013	1.0893	-0.152
17.5	63000	1.0978	0.1098	1.0978	-0.1435
18	64800	1.0893	0.1013	1.0809	-0.1604
18.5	66600	1.1062	0.1182	1.1316	-0.1097
19	68400	1.0556	0.0676	1.1147	-0.1266
19.5	70200	1.0978	0.1098	1.14	-0.1013
20	72000	1.0724	0.0844	1.1484	-0.0929
20.5	73800	1.064	0.076	1.114	-0.1273
21	75600	1.30471	0.31671	1.14	-0.1013
21.5	77400	1.0809	0.0929	1.1484	-0.0929
22	79200	1.0387	0.0507	1.1316	-0.1097
22.5	81000	1.0471	0.0591	1.1147	-0.1266
23	82800	1.064	0.076	1.0724	-0.1689

Figure C3 - Air Sparging Pilot Study
100 SCFM Air Pressure Changes

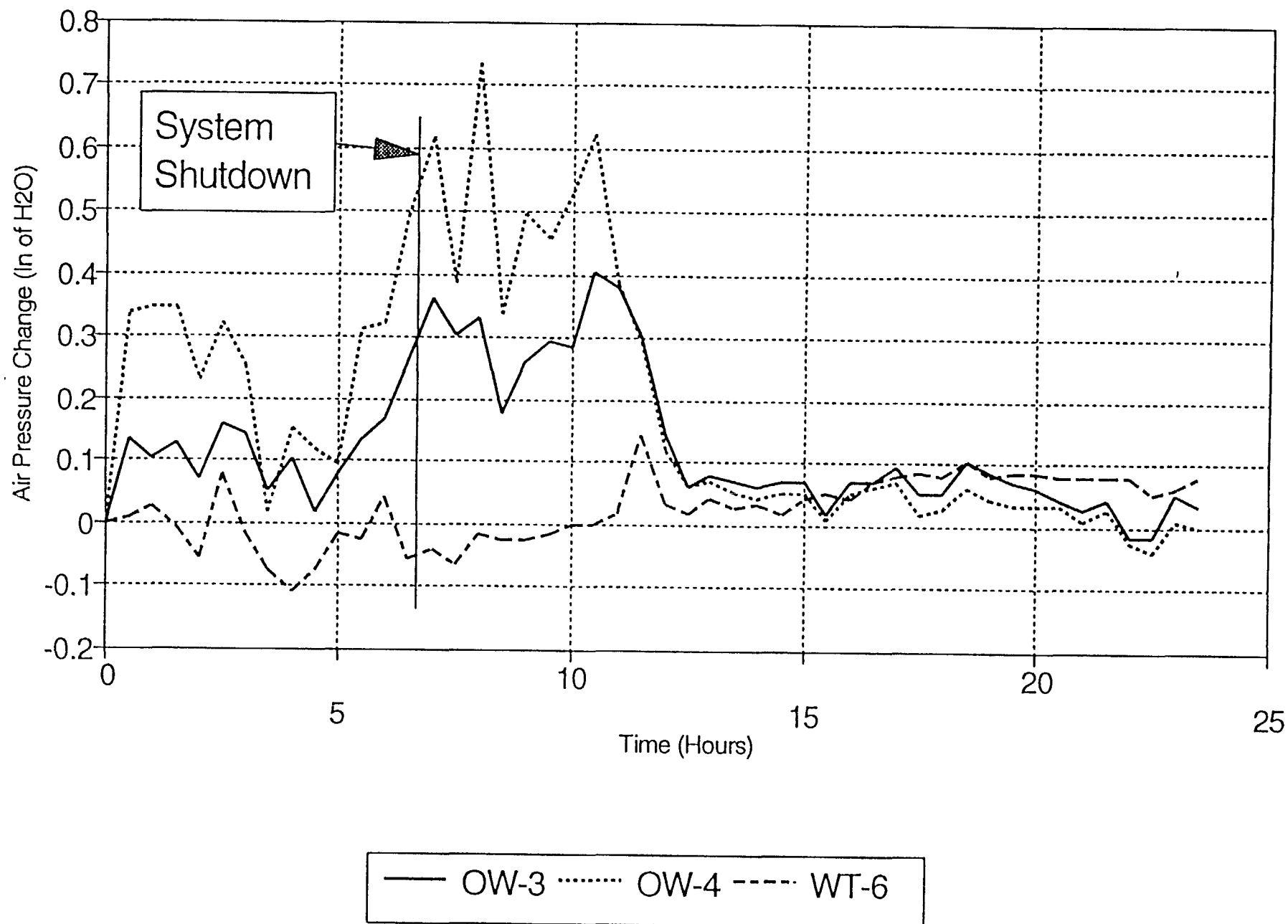
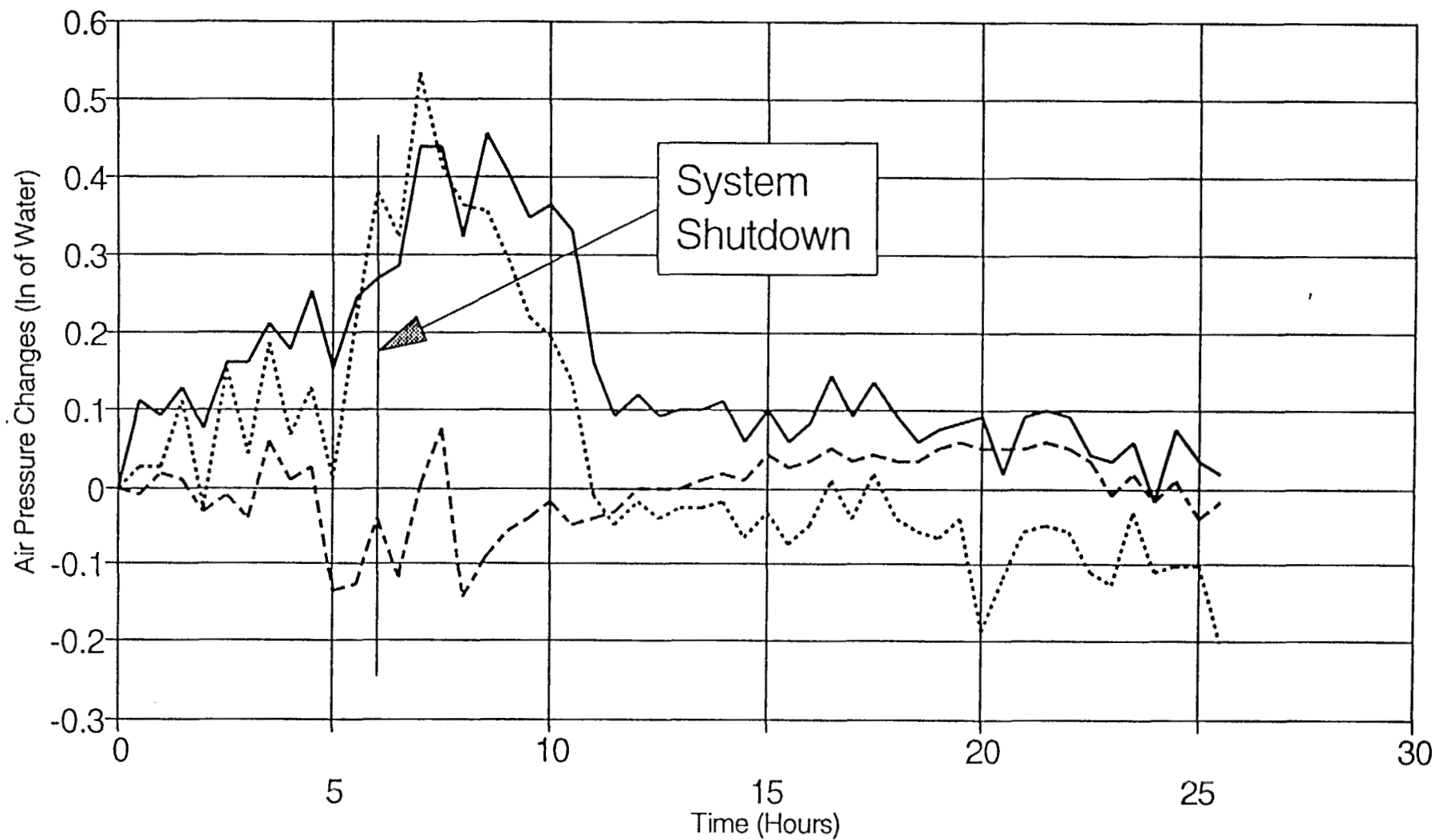


Table C3 - AS-3 100 cfm air pressure changes

time	Hours	Time seconds	OW-3 reading	OW-3 corrected	OW-4 readings	OW-4 corrected	WT-6 Readings	WT-6 Corrected
0		0	1.0218	0	1.2751	0	0.90356	0
0.5		1800	1.1569	0.1351	1.6129	0.3378	0.912	0.00844
1		3600	1.1231	0.1013	1.6213	0.3462	0.92889	0.02533
1.5		5400	1.1484	0.1266	1.6213	0.3462	0.89511	-0.00845
2		7200	1.0893	0.0675	1.5031	0.228	0.84445	-0.05911
2.5		9000	1.1822	0.1604	1.596	0.3209	0.97956	0.076
3		10800	1.1653	0.1435	1.5284	0.2533	0.88667	-0.01689
3.5		12600	1.0724	0.0506	1.292	0.0169	0.82756	-0.076
4		14400	1.1231	0.1013	1.4271	0.152	0.79378	-0.10978
4.5		16200	1.0387	0.0169	1.3933	0.1182	0.82756	-0.076
5		18000	1.0978	0.076	1.368	0.0929	0.88667	-0.01689
5.5		19800	1.1569	0.1351	1.5876	0.3125	0.87823	-0.02533
6		21600	1.1907	0.1689	1.596	0.3209	0.94578	0.04222
6.5		23400	1.2836	0.2618	1.7649	0.4898	0.84445	-0.05911
7		25200	1.3849	0.3631	1.8916	0.6165	0.86134	-0.04222
7.5		27000	1.3258	0.304	1.6636	0.3885	0.836	-0.06756
8		28800	1.3511	0.3293	2.0098	0.7347	0.88667	-0.01689
8.5		30600	1.1991	0.1773	1.6129	0.3378	0.87823	-0.02533
9		32400	1.2836	0.2618	1.7733	0.4982	0.87823	-0.02533
9.5		34200	1.3173	0.2955	1.7311	0.456	0.88667	-0.01689
10		36000	1.3089	0.2871	1.8071	0.532	0.90356	0
10.5		37800	1.4271	0.4053	1.9	0.6249	0.90356	0
11		39600	1.4018	0.38	1.6636	0.3885	0.92045	0.01689
11.5		41400	1.3258	0.304	1.5707	0.2956	1.0471	0.14354
12		43200	1.1653	0.1435	1.3933	0.1182	0.93734	0.03378
12.5		45000	1.0809	0.0591	1.3342	0.0591	0.92045	0.01689
13		46800	1.0978	0.076	1.3427	0.0676	0.94578	0.04222
13.5		48600	1.0893	0.0675	1.3258	0.0507	0.92889	0.02533
14		50400	1.0809	0.0591	1.3173	0.0422	0.93734	0.03378
14.5		52200	1.0893	0.0675	1.3258	0.0507	0.92045	0.01689
15		54000	1.0893	0.0675	1.3258	0.0507	0.94578	0.04222
15.5		55800	1.0387	0.0169	1.2836	0.0085	0.95423	0.05067
16		57600	1.0893	0.0675	1.3258	0.0507	0.94578	0.04222
16.5		59400	1.0893	0.0675	1.3342	0.0591	0.97111	0.06755
17		61200	1.1147	0.0929	1.3427	0.0676	0.97956	0.076
17.5		63000	1.0724	0.0506	1.292	0.0169	0.988	0.08444
18		64800	1.0724	0.0506	1.3004	0.0253	0.97956	0.076
18.5		66600	1.1231	0.1013	1.3342	0.0591	1.0049	0.10134
19		68400	1.1062	0.0844	1.3173	0.0422	0.97956	0.076
19.5		70200	1.0893	0.0675	1.3089	0.0338	0.988	0.08444
20		72000	1.0809	0.0591	1.3089	0.0338	0.988	0.08444
20.5		73800	1.064	0.0422	1.3089	0.0338	0.97956	0.076
21		75600	1.0471	0.0253	1.2836	0.0085	0.97956	0.076
21.5		77400	1.064	0.0422	1.3004	0.0253	0.97956	0.076
22		79200	1.0049	-0.0169	1.2498	-0.0253	0.97956	0.076
22.5		81000	1.0049	-0.0169	1.2329	-0.0422	0.95423	0.05067
23		82800	1.0724	0.0506	1.2836	0.0085	0.96267	0.05911
23.5		84600	1.0556	0.0338	1.2751	0	0.97956	0.076

Figure C4 - Air Sparging Pilot Study
115 SCFM Air Pressure Changes

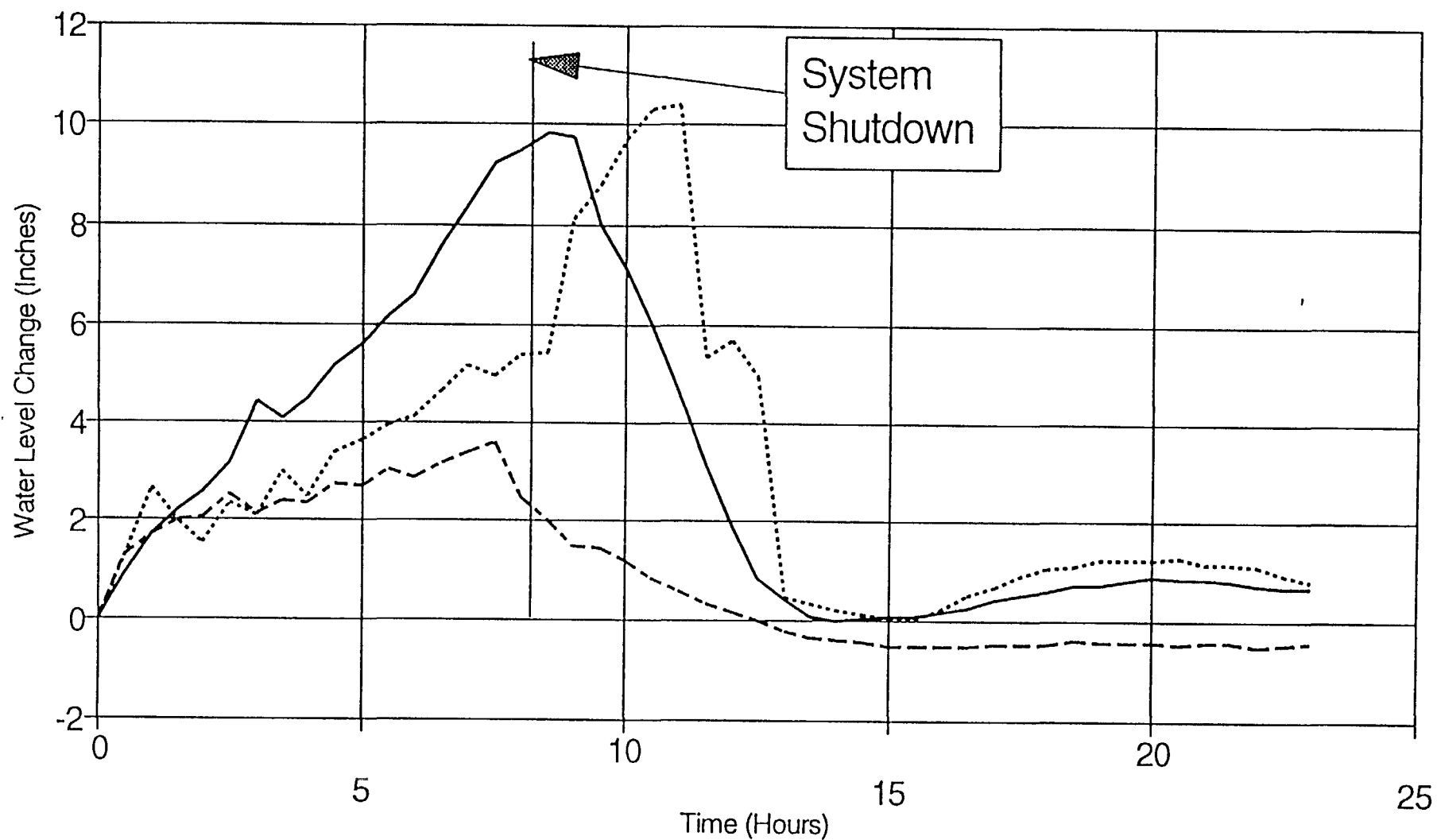


— OW-3 OW-4 ---- WT-6

Table C4 - AS-4 115 cfm air pressure changes

time Hours	Time seconds	OW-3 reading	OW-3 corrected	OW-4 readings	OW-4 corrected	WT-6 readings	WT-6 Corrected
0	0	1.0218	0	1.3596	0	0.96267	0
0.5	1800	1.1316	0.1098	1.3849	0.0253	0.95423	-0.00844
1	3600	1.1147	0.0929	1.3849	0.0253	0.97956	0.01689
1.5	5400	1.1484	0.1266	1.4693	0.1097	0.97111	0.00844
2	7200	1.0978	0.076	1.3342	-0.0254	0.92889	-0.03378
2.5	9000	1.1822	0.1604	1.5116	0.152	0.95423	-0.00844
3	10800	1.1822	0.1604	1.4018	0.0422	0.92045	-0.04222
3.5	12600	1.2336	0.2118	1.5453	0.1857	1.0218	0.05913
4	14400	1.1991	0.1773	1.4271	0.0675	0.9711	0.00843
4.5	16200	1.2751	0.2533	1.4862	0.1266	0.988	0.02533
5	18000	1.1738	0.152	1.368	0.0084	0.82756	-0.13511
5.5	19800	1.2667	0.2449	1.5791	0.2195	0.836	-0.12667
6	21600	1.292	0.2702	1.7396	0.38	0.92045	-0.04222
6.5	23400	1.3089	0.2871	1.6804	0.3208	0.84445	-0.11822
7	25200	1.4609	0.4391	1.8916	0.532	0.96367	0.001
7.5	27000	1.4609	0.4391	1.7733	0.4137	1.0387	0.07603
8	28800	1.3427	0.3209	1.7227	0.3631	0.81911	-0.14356
8.5	30600	1.4778	0.456	1.7142	0.3546	0.86978	-0.09289
9	32400	1.4271	0.4053	1.6551	0.2955	0.90356	-0.05911
9.5	34200	1.368	0.3462	1.5791	0.2195	0.92045	-0.04222
10	36000	1.3849	0.3631	1.5538	0.1942	0.94578	-0.01689
10.5	37800	1.3511	0.3293	1.4947	0.1351	0.912	-0.05067
11	39600	1.1822	0.1604	1.3511	-0.0085	0.92045	-0.04222
11.5	41400	1.1147	0.0929	1.3089	-0.0507	0.92889	-0.03378
12	43200	1.14	0.1182	1.3427	-0.0169	0.96267	0
12.5	45000	1.1147	0.0929	1.3173	-0.0423	0.96267	0
13	46800	1.1231	0.1013	1.3342	-0.0254	0.96267	0
13.5	48600	1.1231	0.1013	1.3342	-0.0254	0.97111	0.00844
14	50400	1.1316	0.1098	1.3427	-0.0169	0.97956	0.01689
14.5	52200	1.0809	0.0591	1.292	-0.0676	0.97111	0.00844
15	54000	1.1231	0.1013	1.3258	-0.0338	1.0049	0.04223
15.5	55800	1.0809	0.0591	1.2836	-0.076	0.988	0.02533
16	57600	1.1062	0.0844	1.3089	-0.0507	0.99645	0.03378
16.5	59400	1.1653	0.1435	1.368	0.0084	1.0133	0.05063
17	61200	1.1147	0.0929	1.3173	-0.0423	0.99645	0.03378
17.5	63000	1.1569	0.1351	1.3764	0.0168	1.0049	0.04223
18	64800	1.1147	0.0929	1.3173	-0.0423	0.99645	0.03378
18.5	66600	1.0809	0.0591	1.3004	-0.0592	0.99645	0.03378
19	68400	1.0978	0.076	1.292	-0.0676	1.0133	0.05063
19.5	70200	1.1062	0.0844	1.3173	-0.0423	1.0218	0.05913
20	72000	1.1147	0.0929	1.173	-0.1866	1.0133	0.05063
20.5	73800	1.0387	0.0169	1.2413	-0.1183	1.0133	0.05063
21	75600	1.1147	0.0929	1.3004	-0.0592	1.0133	0.05063
21.5	77400	1.1231	0.1013	1.3089	-0.0507	1.0218	0.05913
22	79200	1.1147	0.0929	1.3004	-0.0592	1.0133	0.05063
22.5	81000	1.064	0.0422	1.2498	-0.1098	0.99645	0.03378
23	82800	1.0556	0.0338	1.2329	-0.1267	0.95423	-0.00844
23.5	84600	1.0809	0.0591	1.3258	-0.0338	0.97956	0.01689
24	86400	1.0049	-0.0169	1.2498	-0.1098	0.94578	-0.01689
24.5	88200	1.0978	0.076	1.2582	-0.1014	0.97111	0.00844
25	90000	1.0556	0.0338	1.2582	-0.1014	0.92045	-0.04222
25.5	91800	1.0387	0.0169	1.1569	-0.2027	0.94578	-0.01689

Figure C5 - Air Sparging Pilot Study
50 SCFM Water Level Changes

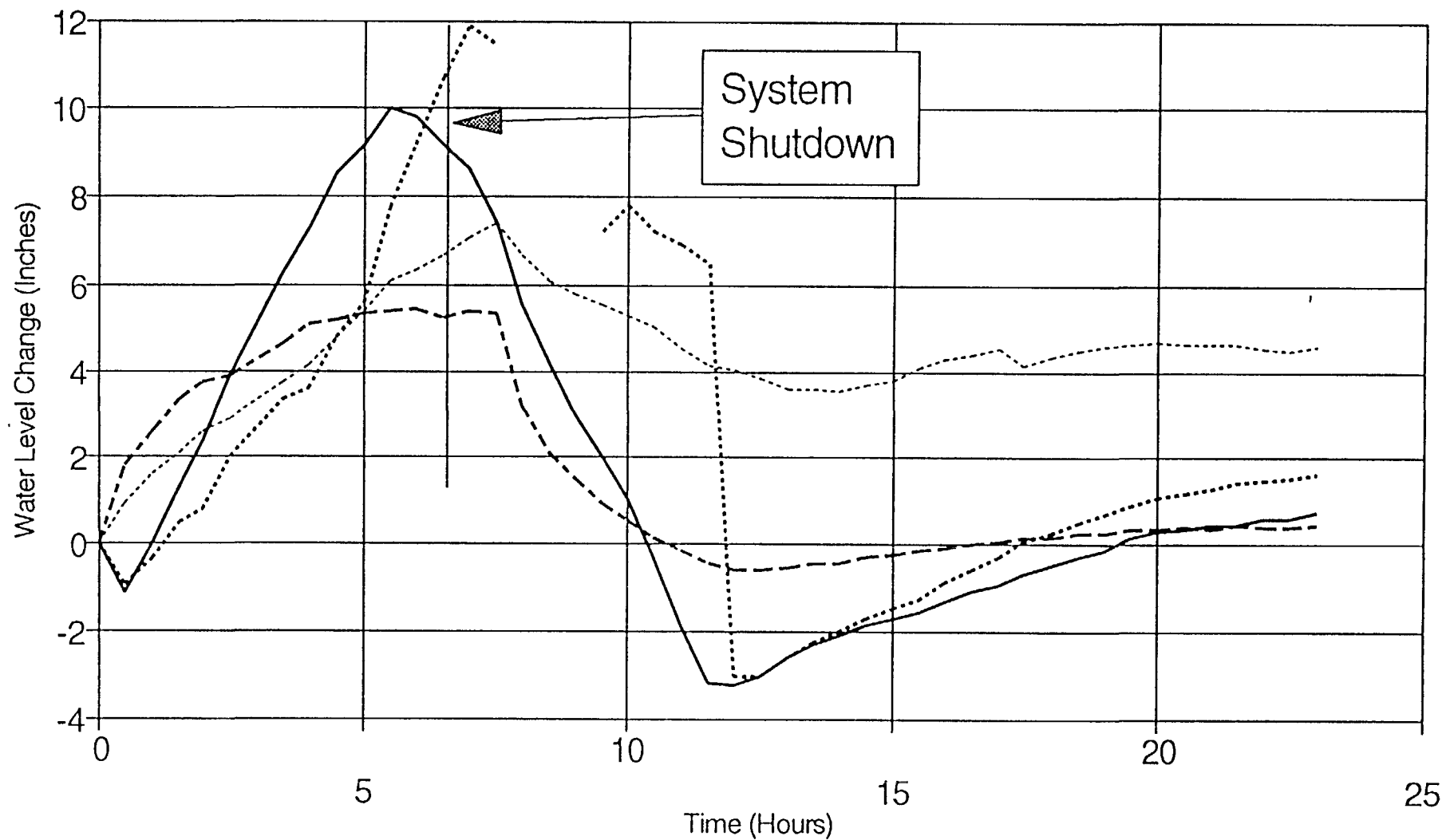


— OW-3 OW-4 - - - - WT-6

Table C5 - AS-1 50 cfm water levels

time Hour	Time seconds	OW-3 reading	OW-3 correcte	OW-4 readings	OW-4 corrected	WT-6 Rea	WT-6 Cor
0	0	9.297	0	23.146	0	14.28	0
0.5	1800	10.209	0.912	24.582	1.2658	15.58	1.3
1	3600	11.02	1.723	26.178	2.6916	16.002	1.722
1.5	5400	11.54	2.243	25.629	1.9724	16.315	2.035
2	7200	11.89	2.593	25.393	1.5662	16.365	2.085
2.5	9000	12.481	3.184	26.347	2.35	16.847	2.567
3	10800	13.722	4.425	26.279	2.1118	16.408	2.128
3.5	12600	13.41	4.113	27.36	3.0226	16.712	2.432
4	14400	13.773	4.476	27.031	2.5234	16.661	2.381
4.5	16200	14.448	5.151	28.103	3.4252	17.033	2.753
5	18000	14.896	5.599	28.542	3.694	16.982	2.702
5.5	19800	15.462	6.165	28.973	3.9548	17.353	3.073
6	21600	15.909	6.612	29.311	4.1226	17.193	2.913
6.5	23400	16.914	7.617	29.995	4.6364	17.48	3.2
7	25200	17.657	8.36	30.679	5.1502	17.666	3.386
7.5	27000	18.561	9.264	30.679	4.98	17.902	3.622
8	28800	18.772	9.475	31.27	5.4008	16.754	2.474
8.5	30600	19.127	9.83	31.506	5.4666	16.281	2.001
9	32400	19.042	9.745	34.301	8.0914	15.757	1.477
9.5	34200	17.303	8.006	35.188	8.8082	15.732	1.452
10	36000	16.424	7.127	36.252	9.702	15.487	1.207
10.5	37800	15.327	6.03	37.021	10.3008	15.158	0.878
11	39600	13.967	4.67	37.308	10.4176	14.904	0.624
11.5	41400	12.464	3.167	32.401	5.3404	14.634	0.354
12	43200	11.231	1.934	32.942	5.7112	14.448	0.168
12.5	45000	10.142	0.845	32.376	4.975	14.254	-0.026
13	46800	9.719	0.422	28.019	0.4478	14.077	-0.203
13.5	48600	9.4071	0.1101	28.103	0.3616	13.95	-0.33
14	50400	9.3227	0.0257	28.129	0.2174	13.874	-0.406
14.5	52200	9.348	0.051	28.221	0.1392	13.832	-0.448
15	54000	9.3649	0.0679	28.306	0.054	13.748	-0.532
15.5	55800	9.3987	0.1017	28.458	0.0358	13.739	-0.541
16	57600	9.4663	0.1693	28.813	0.2206	13.731	-0.549
16.5	59400	9.576	0.279	29.277	0.5144	13.781	-0.499
17	61200	9.7111	0.4141	29.632	0.6992	13.807	-0.473
17.5	63000	9.8125	0.5155	30.012	0.909	13.807	-0.473
18	64800	9.8885	0.5915	30.349	1.0758	13.824	-0.456
18.5	66600	10.04	0.743	30.586	1.1426	13.866	-0.414
19	68400	10.057	0.76	30.856	1.2424	13.84	-0.44
19.5	70200	10.116	0.819	31.008	1.2242	13.84	-0.44
20	72000	10.218	0.921	31.202	1.248	13.857	-0.423
20.5	73800	10.142	0.845	31.439	1.3148	13.807	-0.473
21	75600	10.159	0.862	31.464	1.1696	13.849	-0.431
21.5	77400	10.125	0.828	31.633	1.1684	13.832	-0.448
22	79200	10.032	0.735	31.76	1.1252	13.79	-0.49
22.5	81000	9.9814	0.6844	31.76	0.955	13.798	-0.482
23	82800	9.9814	0.6844	31.793	0.8178	13.832	-0.448

Figure C6 - Air Sparging Pilot Study
75 SCFM Water Level Changes

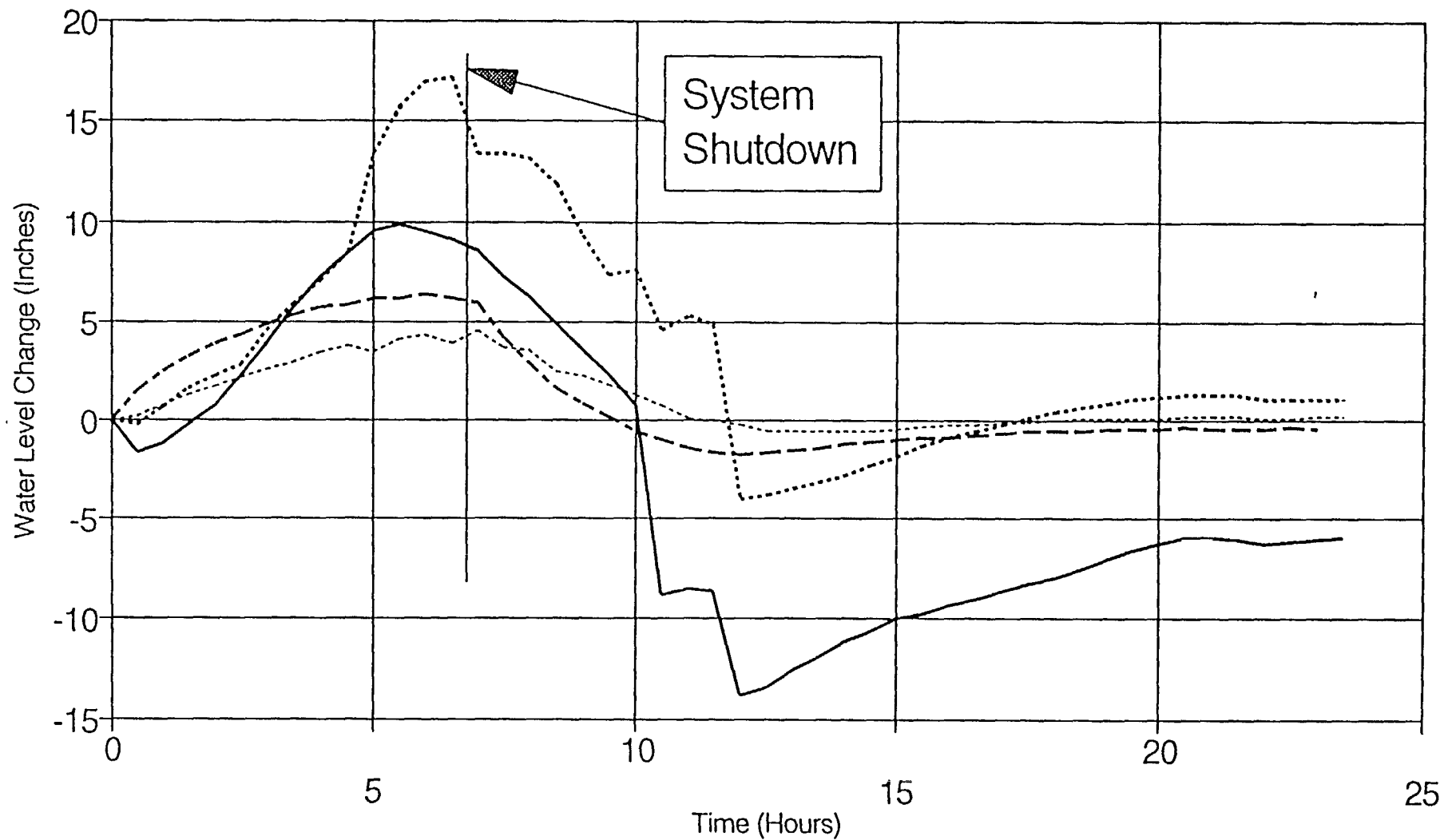


— OW-3 OW-4 - - - - WT-6 WT-20

Table C6 - AS-2 75 cfm water levels

time Hours	Time seconds	OW-3 reading	OW-3 corrected	OW-4 readings	OW-4 corrected	WT-6 Readings	WT-6 Corrected	WT-20 readings	WT-20 corrected
0	0	12.092	0	29.31	0	13.638	0	35.467	0
0.5	1800	10.986	-1.106	28.399	-0.911	15.47	1.832	36.413	0.946
1	3600	12.084	-0.008	28.981	-0.329	16.247	2.609	37.113	1.646
1.5	5400	13.444	1.352	29.809	0.499	16.973	3.335	37.595	2.128
2	7200	14.474	2.382	30.121	0.811	17.387	3.749	38.093	2.626
2.5	9000	16.019	3.927	31.312	2.002	17.531	3.893	38.389	2.922
3.5	12600	18.367	6.275	32.697	3.387	18.316	4.678	39.216	3.749
4	14400	19.329	7.237	32.959	3.649	18.688	5.05	39.63	4.163
4.5	16200	20.605	8.513	34.107	4.797	18.806	5.168	40.289	4.822
5	18000	21.272	9.18	34.901	5.591	18.966	5.328	40.854	5.387
5.5	19800	22.108	10.016	37.046	7.736	18.992	5.354	41.564	6.097
6	21600	21.888	9.796	38.498	9.188	19.068	5.43	41.792	6.325
6.5	23400	21.263	9.171	40.018	10.708	18.899	5.261	42.138	6.671
7	25200	20.723	8.631	41.167	11.857	18.992	5.354	42.509	7.042
7.5	27000	19.498	7.406	40.736	11.426	18.949	5.311	42.881	7.414
8	28800	17.615	5.523			16.847	3.209	42.104	6.637
8.5	30600	16.272	4.18			15.749	2.111	41.572	6.105
9	32400	15.099	3.007			15.183	1.545	41.226	5.759
9.5	34200	14.128	2.036	53.217	7.217	14.592	0.954	40.998	5.531
10	36000	13.144	1.052	53.8	7.8	14.195	0.557	40.761	5.294
10.5	37800	11.78	-0.312	53.217	7.217	13.79	0.152	40.483	5.016
11	39600	10.252	-1.84	52.888	6.888	13.469	-0.169	40.001	4.534
11.5	41400	8.9174	-3.1746	52.466	6.466	13.182	-0.456	39.605	4.138
12	43200	8.8414	-3.2506	42.923	-3.077	13.072	-0.566	39.529	4.062
12.5	45000	9.0778	-3.0142	42.965	-3.035	13.038	-0.6	39.326	3.859
13	46800	9.4578	-2.6342	43.371	-2.629	13.123	-0.515	39.081	3.614
13.5	48600	9.7787	-2.3133	43.734	-2.266	13.19	-0.448	39.056	3.589
14	50400	9.9898	-2.1022	43.97	-2.03	13.216	-0.422	39.039	3.572
14.5	52200	10.201	-1.891	44.257	-1.743	13.359	-0.279	39.165	3.698
15	54000	10.387	-1.705	44.536	-1.464	13.418	-0.22	39.267	
15.5	55800	10.53	-1.562	44.756	-1.244	13.486	-0.152	39.571	4.1
16	57600	10.767	-1.325	45.102	-0.898	13.57	-0.068	39.748	4.281
16.5	59400	11.012	-1.08	45.431	-0.569	13.655	0.017	39.875	4.408
17	61200	11.18	-0.912	45.718	-0.282	13.697	0.059	40.01	4.543
17.5	63000	11.434	-0.658	46.065	0.065	13.781	0.143	39.63	4.163
18	64800	11.594	-0.498	46.25	0.25	13.824	0.186	39.849	4.382
18.5	66600	11.814	-0.278	46.495	0.495	13.9	0.262	39.993	4.526
19	68400	11.983	-0.109	46.673	0.673	13.891	0.253	40.044	4.577
19.5	70200	12.228	0.136	46.926	0.926	13.984	0.346	40.137	4.67
20	72000	12.38	0.288	47.078	1.078	13.984	0.346	40.162	4.695
20.5	73800	12.456	0.364	47.188	1.188	14.018	0.38	40.103	4.636
21	75600	12.523	0.431	47.297	1.297	14.009	0.371	40.12	4.653
21.5	77400	12.565	0.473	47.424	1.424	14.06	0.422	40.077	4.61
22	79200	12.667	0.575	47.492	1.492	14.043	0.405	40.027	4.56
22.5	81000	12.726	0.634	47.542	1.542	14.035	0.397	39.993	4.526
23	82800	12.827	0.735	47.635	1.635	14.085	0.447	40.044	4.577

Figure C7 - Air Sparging Pilot Study
100 SCFM Water Level Changes



— OW-3 OW-4 - - - - WT-6 - WT-20

Table C7 - AS-3 100 cfm water levels

time Hours	Time seconds	OW-3 reading	OW-3 corrected	OW-4 readings	OW-4 corrected	WT-6 Readings	WT-6 Corrected	WT-20 readings	Wt-20 correcte
0	0	15.259	0	41.28	0	14.05	0	40.32	0
0.5	1800	13.629	-1.63	41.09	-0.19	15.57	1.52	40.54	0.22
1	3600	14.018	-1.241	41.9	0.62	16.56	2.51	41.1	0.78
1.5	5400	15.141	-0.118	42.99	1.71	17.36	3.31	41.63	1.31
2	7200	15.952	0.693	43.59	2.31	17.97	3.92	42.1	1.78
2.5	9000	17.556	2.297	44.09	2.81	18.43	4.38	42.48	2.16
3	10800	19.228	3.969	45.85	4.57	18.91	4.86	42.96	2.64
3.5	12600	20.858	5.599	47.13	5.85	19.35	5.3	43.28	2.96
4	14400	22.479	7.22	48.4	7.12	19.73	5.68	43.76	3.44
4.5	16200	23.746	8.487	49.74	8.46	19.91	5.86	44.1	3.78
5	18000	24.768	9.509	54.73	13.45	20.26	6.21	43.8	3.48
5.5	19800	25.105	9.846	57.009	15.729	20.241	6.191	44.4	4.08
6	21600	24.776	9.517	58.199	16.919	20.385	6.335	44.7	4.38
6.5	23400	24.345	9.086	58.444	17.164	20.22	6.17	44.26	3.94
7	25200	23.763	8.504	54.644	13.364	20.01	5.96	44.81	4.49
7.5	27000	22.505	7.246	54.73	13.45	18.3	4.25	43.99	3.67
8	28800	21.533	6.274	54.442	13.162	17	2.95	43.85	3.53
8.5	30600	20.123	4.864	53.09	11.81	15.757	1.707	42.81	2.49
9	32400	18.924	3.665	50.625	9.345	14.96	0.91	42.62	2.3
9.5	34200	17.666	2.407	48.623	7.343	14.31	0.26	42.18	1.86
10	36000	16.061	0.802	48.885	7.605	13.53	-0.52	41.657	1.337
10.5	37800	6.4769	-8.7821	45.837	4.557	13.09	-0.96	41.15	0.83
11	39600	6.8147	-8.4443	46.571	5.291	12.7	-1.35	40.51	0.19
11.5	41400	6.688	-8.571	46.09	4.81	12.46	-1.59	40.31	-0.01
12	43200	1.4102	-13.8488	37.333	-3.947	12.371	-1.679	40.09	-0.23
12.5	45000	1.8325	-13.4265	37.59	-3.69	12.42	-1.63	39.82	-0.5
13	46800	2.6093	-12.6497	37.882	-3.398	12.58	-1.47	39.75	-0.57
13.5	48600	3.3356	-11.9234	38.152	-3.128	12.71	-1.34	39.73	-0.59
14	50400	4.1209	-11.1381	38.557	-2.723	12.84	-1.21	39.79	-0.53
14.5	52200	4.63	-10.629	39.02	-2.26	12.99	-1.06	39.84	-0.4
15	54000	5.18	-10.079	39.51	-1.77	13.089	-0.961	39.93	-0.3
15.5	55800	5.56	-9.699	39.98	-1.3	13.148	-0.902	39.97	-0.35
16	57600	5.95	-9.309	40.39	-0.89	13.283	-0.767	40.07	-0.25
16.5	59400	6.26	-8.999	40.72	-0.56	13.334	-0.716	40.11	-0.21
17	61200	6.68	-8.579	41.14	-0.14	13.44	-0.61	40.24	-0.08
17.5	63000	6.97	-8.289	41.48	0.2	13.469	-0.581	40.27	-0.05
18	64800	7.3	-7.959	41.71	0.43	13.511	-0.539	40.32	0
18.5	66600	7.77	-7.489	41.94	0.66	13.596	-0.454	40.4	0.08
19	68400	8.28	-6.979	42.19	0.91	13.629	-0.421	40.45	0.13
19.5	70200	8.74	-6.519	42.417	1.137	13.663	-0.387	40.51	0.19
20	72000	9.04	-6.219	42.53	1.25	13.68	-0.37	40.52	0.2
20.5	73800	9.28	-5.979	42.636	1.356	13.697	-0.353	40.53	0.21
21	75600	9.28	-5.979	42.59	1.31	13.68	-0.37	40.53	0.21
21.5	77400	9.2	-6.059	42.543	1.263	13.65	-0.4	40.53	0.21
22	79200	9.07	-6.189	42.43	1.15	13.66	-0.39	40.5	0.18
22.5	81000	9.15	-6.109	42.4	1.12	13.7	-0.35	40.5	0.18
23	82800	9.24	-6.019	42.383	1.103	13.69	-0.36	40.53	0.21
23.5	84600	9.32	-5.939	42.38	1.1			40.53	0.21

Table H.1 100 CFM Air Pressure Data

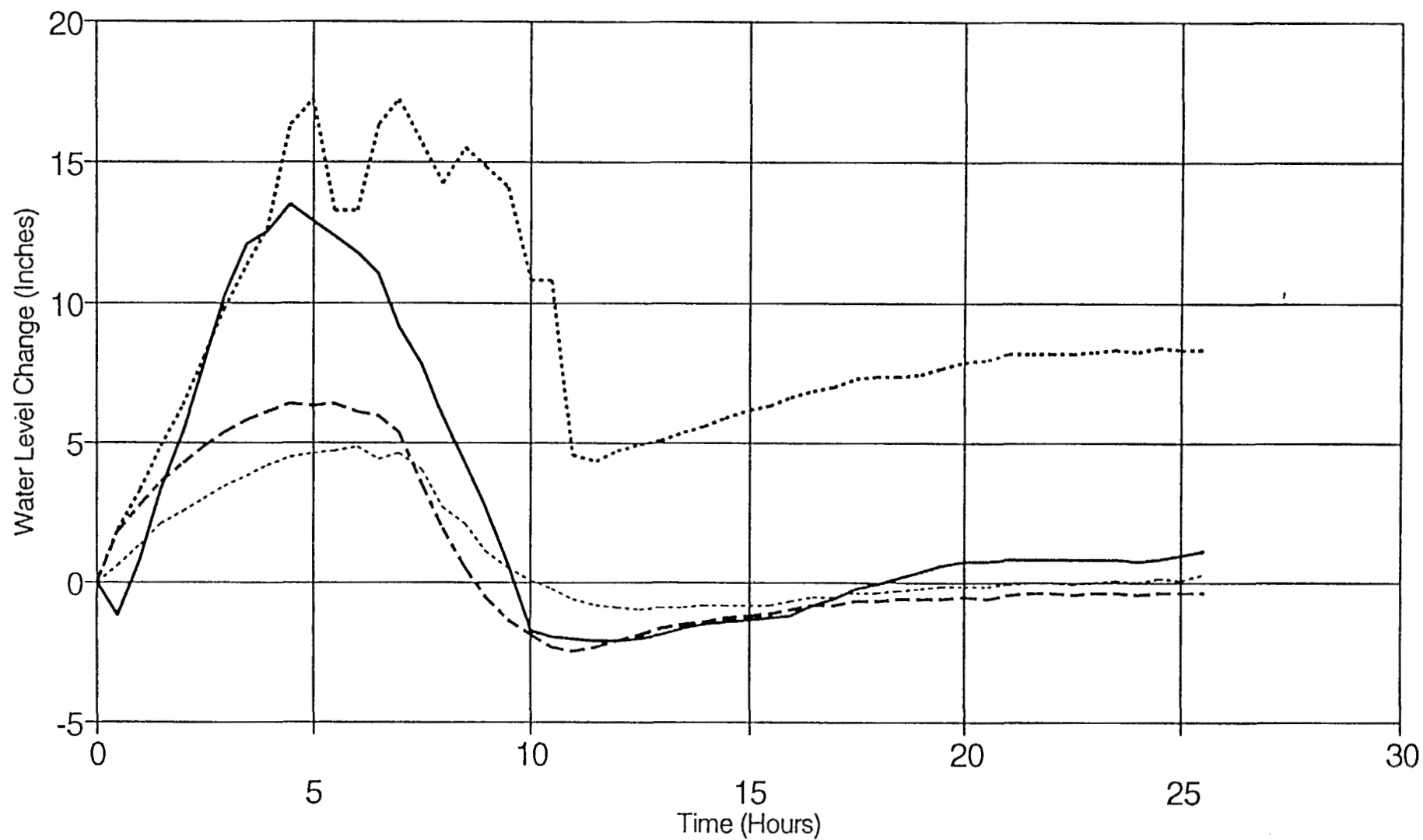
Time (sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
39270	10.91	1.469	-0.118	1.799	-0.093	0.980	-0.186	1.588	-0.279
39570	10.99	1.444	-0.144	1.782	-0.110	0.954	-0.211	1.588	-0.279

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Table H.2 150 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
0	0.00	1.4609	0	1.8156	0	0.99645	0	1.6129	0
30	0.01	1.4609	0	1.7902	-0.0254	0.96267	-0.03378	1.672	0.0591
60	0.02	1.4609	0	1.7902	-0.0254	0.97956	-0.01689	1.7142	0.1013
90	0.03	1.4609	0	1.7902	-0.0254	0.97956	-0.01689	1.7396	0.1267
120	0.03	1.444	-0.0169	1.7818	-0.0338	0.95423	-0.04222	1.7227	0.1098
150	0.04	1.4609	0	1.7987	-0.0169	0.97956	-0.01689	1.7227	0.1098
180	0.05	1.4356	-0.0253	1.8071	-0.0085	0.99645	0	1.7396	0.1267
210	0.06	1.4356	-0.0253	1.7902	-0.0254	0.99645	0	1.7227	0.1098
240	0.07	1.4271	-0.0338	1.7818	-0.0338	0.97956	-0.01689	1.7227	0.1098
270	0.08	1.3933	-0.0676	1.7818	-0.0338	0.97111	-0.02534	1.7142	0.1013
300	0.08	1.2582	-0.2027	1.7565	-0.0591	0.95423	-0.04222	1.7142	0.1013
330	0.09	1.2076	-0.2533	1.7142	-0.1014	0.96267	-0.03378	1.7142	0.1013
360	0.10	1.14	-0.3209	1.6973	-0.1183	0.93734	-0.05911	1.7227	0.1098
390	0.11	1.1231	-0.3378	1.6467	-0.1689	0.912	-0.08445	1.6973	0.0844
420	0.12	1.1062	-0.3547	1.6551	-0.1605	0.88667	-0.10978	1.672	0.0591
450	0.13	1.1062	-0.3547	1.6298	-0.1858	0.89511	-0.10134	1.6467	0.0338
480	0.13	1.0556	-0.4053	1.6129	-0.2027	0.89511	-0.10134	1.6298	0.0169
510	0.14	1.0387	-0.4222	1.596	-0.2196	0.85289	-0.14356	1.672	0.0591
540	0.15	1.0471	-0.4138	1.5622	-0.2534	0.82756	-0.16889	1.6382	0.0253
570	0.16	1.0387	-0.4222	1.5876	-0.228	0.86134	-0.13511	1.6129	0
600	0.17	1.0218	-0.4391	1.5622	-0.2534	0.82756	-0.16889	1.6298	0.0169
630	0.18	1.0133	-0.4476	1.5707	-0.2449	0.86978	-0.12667	1.6298	0.0169
660	0.18	0.99645	-0.46445	1.5284	-0.2872	0.82756	-0.16889	1.5876	-0.0253
690	0.19	1.0218	-0.4391	1.596	-0.2196	0.86134	-0.13511	1.6382	0.0253
720	0.20	0.99645	-0.46445	1.5453	-0.2703	0.86134	-0.13511	1.6298	0.0169
750	0.21	0.97956	-0.48134	1.52	-0.2956	0.82756	-0.16889	1.6129	0
780	0.22	0.97956	-0.48134	1.5538	-0.2618	0.836	-0.16045	1.5876	-0.0253
810	0.23	0.89511	-0.56579	1.4778	-0.3378	0.74311	-0.25334	1.5453	-0.0676
840	0.23	0.95423	-0.50667	1.5453	-0.2703	0.836	-0.16045	1.6129	0
870	0.24	0.95423	-0.50667	1.5284	-0.2872	0.81911	-0.17734	1.6129	0
900	0.25	0.95423	-0.50667	1.52	-0.2956	0.81067	-0.18578	1.6129	0
930	0.26	0.97111	-0.48979	1.5453	-0.2703	0.836	-0.16045	1.6044	-0.0085
960	0.27	1.0133	-0.4476	1.5453	-0.2703	0.85289	-0.14356	1.6298	0.0169
990	0.28	0.99645	-0.46445	1.5453	-0.2703	0.836	-0.16045	1.6129	0

Figure C8 - Air Sparging Pilot Study
115 SCFM Water Level Changes



— OW-3 OW-4 - - - - WT-6 - WT-20

Table C8 - AS-4 115 cfm water levels

time Hours	Time seconds	OW-3 reading	OW-3 corrected	OW-4 readings	OW-4 corrected	WT-6 Readings	WT-6 Corrected	WT-20 readings	Wt-20 correct...
0	0	11.299	0	37.24	0	13.722	0	40.533	0
0.5	1800	10.057	-1.242	39.064	1.824	15.487	1.765	41.133	0.6
1	3600	12.143	0.844	40.517	3.277	16.475	2.753	41.842	1.309
1.5	5400	14.567	3.268	42.087	4.847	17.32	3.598	42.569	2.036
2	7200	16.619	5.32	43.565	6.325	17.987	4.265	43.016	2.483
2.5	9000	19.068	7.769	45.305	8.065	18.536	4.814	43.531	2.998
3	10800	21.5	10.201	46.943	9.703	19.059	5.337	43.953	3.42
3.5	12600	23.349	12.05	48.606	11.366	19.498	5.776	44.342	3.809
4	14400	23.805	12.506	49.789	12.549	19.811	6.089	44.68	4.147
4.5	16200	24.742	13.443	53.606	16.366	20.098	6.376	45.017	4.484
5	18000	24.227	12.928	54.408	17.168	20.039	6.317	45.119	4.586
5.5	19800	23.661	12.362	50.54	13.3	20.132	6.41	45.254	4.721
6	21600	23.113	11.814	50.498	13.258	19.853	6.131	45.364	4.831
6.5	23400	22.293	10.994	53.614	16.374	19.642	5.92	44.916	4.383
7	25200	20.486	9.187	54.425	17.185	19.059	5.337	45.136	4.603
7.5	27000	19.118	7.819	52.922	15.682	17.201	3.479	44.604	4.071
8	28800	17.218	5.919	51.503	14.263	15.648	1.926	43.168	2.635
8.5	30600	15.555	4.256	52.77	15.53	14.28	0.558	42.585	2.052
9	32400	13.959	2.66	52.102	14.862	13.232	-0.49	41.648	1.115
9.5	34200	11.974	0.675	51.292	14.052	12.388	-1.334	41.065	0.532
10	36000	9.576	-1.723	48.074	10.834	11.788	-1.934	40.618	0.085
10.5	37800	9.356	-1.943	48.066	10.826	11.417	-2.305	40.272	-0.261
11	39600	9.264	-2.035	41.8	4.56	11.256	-2.466	39.883	-0.65
11.5	41400	9.196	-2.103	41.564	4.324	11.375	-2.347	39.672	-0.861
12	43200	9.179	-2.12	41.918	4.678	11.628	-2.094	39.621	-0.912
12.5	45000	9.289	-2.01	42.104	4.864	11.814	-1.908	39.588	-0.945
13	46800	9.4663	-1.8327	42.298	5.058	12.008	-1.714	39.613	-0.92
13.5	48600	9.6267	-1.6723	42.585	5.345	12.185	-1.537	39.63	-0.903
14	50400	9.7534	-1.5456	42.839	5.599	12.329	-1.393	39.681	-0.852
14.5	52200	9.8716	-1.4274	43.117	5.877	12.422	-1.3	39.664	-0.8
15	54000	9.956	-1.343	43.405	6.165	12.548	-1.174	39.731	-0.6
15.5	55800	9.9898	-1.3092	43.565	6.325	12.591	-1.131	39.74	-0.793
16	57600	10.091	-1.208	43.827	6.587	12.717	-1.005	39.858	-0.675
16.5	59400	10.471	-0.828	44.08	6.84	12.869	-0.853	40.001	-0.532
17	61200	10.716	-0.583	44.266	7.026	12.886	-0.836	40.027	-0.506
17.5	63000	11.062	-0.237	44.561	7.321	13.03	-0.692	40.187	-0.346
18	64800	11.206	-0.093	44.629	7.389	13.038	-0.684	40.204	-0.329
18.5	66600	11.451	0.152	44.654	7.414	13.072	-0.65	40.246	-0.287
19	68400	11.653	0.354	44.671	7.431	13.097	-0.625	40.28	-0.253
19.5	70200	11.89	0.591	44.933	7.693	13.165	-0.557	40.373	-0.16
20	72000	12.016	0.717	45.136	7.896	13.216	-0.506	40.432	-0.101
20.5	73800	12.05	0.751	45.237	7.997	13.165	-0.557	40.39	-0.143
21	75600	12.118	0.819	45.389	8.149	13.266	-0.456	40.483	-0.05
21.5	77400	12.109	0.81	45.473	8.233	13.292	-0.43	40.508	-0.025
22	79200	12.109	0.81	45.482	8.242	13.308	-0.414	40.517	-0.016
22.5	81000	12.109	0.81	45.465	8.225	13.275	-0.447	40.483	-0.05
23	82800	12.126	0.827	45.524	8.284	13.308	-0.414	40.491	-0.042
23.5	84600	12.109	0.81	45.575	8.335	13.342	-0.38	40.55	0.017
24	86400	12.016	0.717	45.516	8.276	13.283	-0.439	40.525	-0.008
24.5	88200	12.126	0.827	45.634	8.394	13.359	-0.363	40.677	0.144
25	90000	12.253	0.954	45.592	8.352	13.325	-0.397	40.643	0.11
25.5	91800	12.405	1.106	45.583	8.343	13.368	-0.354	40.829	0.296

APPENDIX D
PRODUCT RECOVERY PILOT STUDY
SOIL SAMPLES
LABORATORY RESULTS

12-Apr-94

Summary of Analytical Results For The FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS

	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12
SITE:	88	88	88	84	84
LOCATION:	PR-1-88-082093	PR-1-88-082093MS	PR-1-88-082093MSD	PR-1-84-082093	PR-4-84D-082093
DEPTH:	15075.01	15075.02	15075.03	15075.04	15075.05
SAMPLE NUMBER:	SOIL	SOIL	SOIL	SOIL	SOIL
LAB SAMPLE NO.:	BLK-082593 @ 1016	BLK-082593 @ 1016	BLK-082593 @ 1016	BLK-082593 @ 1016	BLK-082593 @ 1016
MATRIX:	TB-082093-1	TB-082093-1	TB-082093-1	TB-082093-1	TB-082093-1
METHOD BLANK (MB):	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI
TRIP BLANK (TB):	ER-082093-1	ER-082093-1	ER-082093-1	ER-082093-1	ER-082093-1
FIELD BLANK (FB):	08/20/93	08/20/93	08/20/93	08/20/93	08/20/93
EQUIP. RINSEATE (ER):	08/25/93	08/25/93	08/25/93	08/25/93	08/25/93
DATE SAMPLED:					
DATE ANALYZED:					

CRQL

	1	1	1	1	1
BENZENE	ND	19.5	19.0	(1.1) ND	(1.1) ND
TOULENE	ND	20.5	20.0	(1.1) ND	(1.1) ND
ETHYLBENZENE	0.5	20.2	19.7	(1.1) ND	(1.1) ND
XYLENES	12.6	66.5	62.0	(1.1) ND	(1.1) ND

UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Level					
Dilution Factor:	1.00	1.00	1.00	1.00	1.00
Percent Solids, (%)	95.80			95.50	95.40
Sample Weight(grams)	5.0	5.0	5.0	5.0	5.0

NOTE:

() DENOTES CRQL
FOR THAT SPECIFIC SAMPLE

Summary of Analytical Results For The FS-12 Pilot Study - Soil Data

SD1BTEX.WQ1

Summary of Analytical Results For The FS-12 Pilot Study - Soil Data

SITE:	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12
DEPTH:	90	92	80
SAMPLE NUMBER:	PR-1-90-082093	PR-1-92-082093	PR-1-80-082093
LAB SAMPLE NO.:	15075.10	15075.11	15075.12
MATRIX:	SOIL	SOIL	SOIL
METHOD BLANK (MB):	BLK-082693 @ 0902	082693 @ 0902	BLK-082593 @ 1016
TRIP BLANK (TB):	NA	NA	NA
FIELD BLANK (FB):	FB-082093-1-P, FB-082093-2-DI	FB-082093-1-P, FB-082093-2-DI	FB-082093-1-P, FB-082093-2-DI
EQUIP. RINSEATE (ER):	ER-082093-1	ER-082093-1	ER-082093-1
DATE SAMPLED:	08/20/93	08/20/93	08/20/93
DATE ANALYZED:	08/26/93	08/26/93	08/25/93

CRQL

[illegible]

UNITS	ug/kg	ug/kg	ug/kg
Level			
Dilution Factor:	125.00	125.00	1.00
Percent Solids, (%)	91.40	89.80	96.50
Sample Weight(grams)	5.0	5.0	5.0

NOTE:

12-Apr-94

Summary of Analytical Results For The FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:	MMR	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:	88	84	84	90	92
SAMPLE NUMBER:	PR-1-88-082093	PR-1-84-082093	PR-1-84D-082093	PR-1-90-082093	PR-1-92-082093
LAB SAMPLE NO.:	15075.01	15075.04	15075.05	15075.10	15075.11
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
METHOD BLANK (MB):	BLK082593 @ 1016	BLK-082593 @ 1016	BLK-082593 @ 1016	BLK-082693 @ 0902	BLK-082693 @ 0902
TRIP BLANK (TB):	TB-082093-1	TB-082093-1	TB-082093-1	NA	NA
FIELD BLANK (FB):	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI
EQUIP. RINSEATE (ER):	ER-082093-1	ER-082093-1	ER-082093-1	ER-082093-1	ER-082093-1
DATE SAMPLED:	08/20/93	08/20/93	08/20/93	08/20/93	08/20/93
DATE ANALYZED:	08/31/93	08/31/93	08/31/93	08/31/93	08/31/93

		MDL					
PETROLEUM HYDROCARBON	104		281	(105) 375	(105) 333	(110) 418	(111) 411
UNITS			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Level							
Dilution Factor:			1	1	1	1	1
Percent Solids, (%):			95.80		95.40	91.40	89.80
Sample Weight (grams):			0.5	0.5	0.5	0.5	0.5

NOTE: () DENOTES MDL
FOR THE SPECIFIC SAMPLE

12-Apr-94

Summary of Analytical Results For The FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS

REF: STUDY SOIL BORINGS	
SITE:	MMR
LOCATION:	FS-12
DEPTH:	80
SAMPLE NUMBER:	PR-1-80-082093
LAB SAMPLE NO.:	15075.12
MATRIX:	SOIL
METHOD BLANK (MB):	BLK-082593@1016
TRIP BLANK (TB):	NA
FIELD BLANK (FB):	FB-082093-1-P, FB-082093-2-DI
EQUIP. RINSEATE (ER):	ER-082093-1
DATE SAMPLED:	08/20/93
DATE ANALYZED:	08/31/93

MDL

PETROLEUM HYDROCARBON	104	(103) 258
-----------------------	-----	-----------

UNITS	mg/kg
Level	
Dilution Factor:	1
Percent Solids, (%):	96.50
Sample Weight (grams):	0.5

NOTE: _____

12-Apr-94

Summary of Analytical Results For The FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:	MMR	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:	88	88	88	84	84
SAMPLE NUMBER:	PR-1-88-082093	PR-1-88-082093MS	PR-1-88-082093MSD	PR-1-84-082093	PR-1-84D-082093
LAB SAMPLE NO.:	15075.01	15075.02	15075.03	15075.04	15075.05
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
METHOD BLANK (MB):	SBLK-08239301	SBLK-08239301	SBLK-08239301	SBLK-08239301	SBLK-08239301
TRIP BLANK (TB):	TB-082093-1	TB-082093-1	TB-082093-1	TB-082093-1	TB-082093-1
FIELD BLANK (FB):	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI
EQUIP. RINSEATE (ER):	ER-082093-1	ER-082093-1	ER-082093-1	ER-082093-1	ER-082093-1
DATE SAMPLED:	08/20/93	08/20/93	08/20/93	08/20/93	08/20/93
DATE ANALYZED:	08/23/93	08/23/93	08/23/93	08/23/93	08/23/93

MDL

PETROLEUM HYDROCARBON	10					

UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Level					
Dilution Factor:	1	1	1	1	1
Percent Solids, (%)	95.80			95.50	95.40
Sample Weight(grams)	30g	30g	30g	30g	30g

NOTE:

 () DENOTES MDL
 FOR THE SPECIFIC SAMPLE

12-Apr-94

Summary of Analytical Results For The FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS		MMR	MMR	MMR	MMR	MMR
SITE:		FS-12	FS-12	FS-12	FS-12	FS-12
LOCATION:						
DEPTH:					90	92
SAMPLE NUMBER:		ER-082093-1	FB-082093-1-P	FB-082093-2-DI	PR-1-90-082093	PR-1-92-082093
LAB SAMPLE NO.:		15075.07	15075.08	15075.09	15075.10	15075.11
MATRIX:		WATER	WATER	WATER	SOIL	SOIL
METHOD BLANK (MB):		WBLK-08239301	WBLK-08239301	WBLK-08239301	SBLK-08239301	SBLK-08239301
TRIP BLANK (TB):		TB-082093-1	TB-082093-1	TB-082093-1	NA	NA
FIELD BLANK (FB):		FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI	FB-082093-1-P,FB-082093-2-DI
EQUIP. RINSEATE (ER):		ER-082093-1	ER-082093-1	ER-082093-1	ER-082093-1	ER-082093-1
DATE SAMPLED:		08/20/93	08/20/93	08/20/93	08/20/93	08/20/93
DATE ANALYZED:		08/23/93	08/23/93	08/23/93	08/23/93	08/23/93
MDL						
PETROLEUM HYDROCARBON	10	_____	_____	_____	_____	_____
		_____	_____	_____	_____	_____
		(0.5) ND	(0.5) ND	(0.5) ND	(11) 82	(11) 84
		_____	_____	_____	_____	_____
		_____	_____	_____	_____	_____
		_____	_____	_____	_____	_____
		_____	_____	_____	_____	_____
		_____	_____	_____	_____	_____
		_____	_____	_____	_____	_____
		_____	_____	_____	_____	_____
UNITS		mg/L	mg/L	mg/L	mg/kg	mg/kg
Level		_____	_____	_____	_____	_____
Dilution Factor:		1	1	1	1	1
Percent Solids, (%)		NA	NA	NA	91.40	89.80
Sample Weight(grams)		NA	NA	NA	30g	30g
NOTE:		_____	_____	_____	_____	_____

12-Apr-94

Summary of Analytical Results For The FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:	MMR
LOCATION:	FS-12
DEPTH:	80
SAMPLE NUMBER:	PR-1-80-082093
LAB SAMPLE NO.:	15075.12
MATRIX:	SOIL
METHOD BLANK (MB):	SBLK-08239301
TRIP BLANK (TB):	NA
FIELD BLANK (FB):	FB-082093-1-P, FB-082093-2-DI
EQUIP. RINSEATE (ER):	ER-082093-1
DATE SAMPLED:	08/20/93
DATE ANALYZED:	08/23/93

MDL

PETROLEUM HYDROCARBON

10

ND

UNITS

mg/kg

Level

Dilution Factor:

1

Percent Solids, (%)

96.50

Sample Weight(grams)

30g

NOTE:

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

[illegible]

12-Apr-94

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:
LOCATION:
DEPTH:
SAMPLE NUMBER:
LAB SAMPLE NO.:
MATRIX:
METHOD BLANK (MB):
TRIP BLANK (TB):
FIELD BLANK (FB):
EQUIP. RINSEATE (ER):
DATE SAMPLED:
DATE ANALYZED:

MMR	MMR	MMR
FS-12	FS-12	FS-12
74	86	90
WT-17-74D-091193	WT-17-86-091193	WT-17-90-091193
15368.06	15368.07	15368.08
SOIL	SOIL	SOIL
BLK-091493@1341	BLK-091493@1341	BLK-091493@1341
TB-091193-1	TB-091193-1	TB-091193-1
FB-091193-2-DI,FB-091193-1-P		
TB-091193-1	TB-091193-1	TB-091193-1
09/11/93	09/11/93	09/11/93
09/14/93	09/14/93	09/14/93

CRQL

BENZENE	1	ND	ND	ND
TOULENE	1	ND	ND	ND
ETHYLBENZENE	1	ND	ND	ND
XYLENES	1	ND	ND	ND

UNITS	ug/kg	ug/kg	ug/kg
Level			
Dilution Factor:	1	1	1
Percent Solids, (%)		95.32	95.84
Sample Weight (grams)	5.0	5.0	5.0

NOTE:

12-Apr-94

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

PILOT STUDY SOIL BORINGS

	MMR	MMR	MMR
SITE:	FS-12	FS-12	FS-12
LOCATION:	74	86	90
DEPTH:	WT-17-74-091193	WT-17-86-091193	WT-17-90-091193
SAMPLE NUMBER:	15368.05	15368.07	15368.08
LAB SAMPLE NO.:	SOIL	SOIL	SOIL
MATRIX:	BLK-091493@1341	BLK-091493@1341	BLK-091493@1341
METHOD BLANK (MB):	TB-091193-1	TB-091193-1	TB-091193-1
TRIP BLANK (TB):	FB-091193-2-DI,FB-091193-1-P	FB-091193-2-DI,FB-091193-1-P	FB-091193-2-DI,FB-091193-1-P
FIELD BLANK (FB):	ER-091193-1	ER-091193-1	ER-091193-1
EQUIP. RINSEATE (ER):	09/11/93	09/11/93	09/11/93
DATE SAMPLED:	09/14/93	09/16/93	09/16/93
DATE ANALYZED:			

MDL

ORGANIC CARBON

104

(105)105

(105)360

380

UNITS

Level

Dilution Factor:

Percent Solids, (%)

Sample Weight(grams)

mg/kg

mg/kg

mg/kg

1

1

1

95.18

95.32

95.84

0.5

0.5

0.5

NOTE:

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

SITE:	MMR	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:				74	74
SAMPLE NUMBER:	FB-091193-2-DI	FB-099193-1-P	ER-091193-1	WT-17-74-091193	WT-17-74D-091193
LAB SAMPLE NO.:	15368.01	15368.03	15368.04	15368.05	15368.06
MATRIX:	WATER	WATER	WATER	SOIL	SOIL
METHOD BLANK (MB):	WBLK-09159301	WBLK-09159301	WBLK-09159301	SBLK-09149301	SBLK-09149301
TRIP BLANK (TB):	TB-091193-1	TB-091193-1	TB-091193-1	TB-091193-1	TB-091193-1
FIELD BLANK (FB):	FB-091193-2-DI,FB-091193-1-P	FB-091193-2-DI,FB-091193-1-P	FB-091193-2-DI,FB-091193-1-P	FB-091193-2-DI,FB-091193-1-P	FB-091193-2-DI,FB-091193-1-P
EQUIP. RINSEATE (ER):	ER-091193-1	ER-091193-1	ER-091193-1	ER-091193-1	ER-091193-1
DATE SAMPLED:	09/11/93	09/11/93	09/11/93	09/11/93	09/11/93
DATE ANALYZED:	09/15/93	09/15/93	09/15/93	09/14/93	09/14/93

[illegible]

UNITS	mg/L	mg/L	mg/L	mg/kg	mg/kg
Level					
Dilution Factor:	1	1	1	1	1
Percent Solids, (%)					
Sample Weight(grams)	NA 30g	NA 30g	NA 30g	95.18 30g	NA 30g

NOTE: () DENOTES MDL FOR THE SPECIFIC SAMPLE

SD4TPH.WQ1

12-Apr-94

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:	MMR	MMR
LOCATION:	FS-12	FS-12
DEPTH:	86	90
SAMPLE NUMBER:	WT-17-86-091193	WT-17-90-091193
LAB SAMPLE NO.:	15368.07	15368.08
MATRIX:	SOIL	SOIL
METHOD BLANK (MB):	SBLK-09149301	SBLK-09149301
TRIP BLANK (TB):	TB-091193-1	TB-091193-1
FIELD BLANK (FB):	FB-091193-2-DI, FB-091193-1-P	FB-091193-2-DI, FB-091193-1-P
EQUIP. RINSEATE (ER):	ER-091193-1	ER-091193-1
DATE SAMPLED:	09/11/93	09/11/93
DATE ANALYZED:	09/14/93	09/14/93

MDL

PETROLEUM HYDROCARBON	10		
		ND	ND

UNITS	mg/kg	mg/kg
Level		
Dilution Factor:	1	1
Percent Solids, (%)		
Sample Weight(grams)	95.32	95.84
	30g	30g

NOTE:

12-Apr-94

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:	MMR	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:		78	86	90	
SAMPLE NUMBER:	TB-091293-1	WT-18-78-091293	WT-18-86-091293	WT-18-90-091293	TB-091393-1
LAB SAMPLE NO.:	15384.01	15384.02	15384.03	15384.04	15384.05
MATRIX:	WATER	SOIL	SOIL	SOIL	WATER
METHOD BLANK (MB):	BLK-091593@0902	BLK-091593@1112	BLK-091593@1112	BLK-091593@1112	BLK-091593@0902
TRIP BLANK (TB):	TB-091293-1	TB-091293-1,TB-091393-1	TB-091293-1,TB-091393-1	TB-091293-1,TB-091393-1	TB-091393-1
FIELD BLANK (FB):					
EQUIP. RINSEATE (ER):					
DATE SAMPLED:	09/12/93	09/12/93	09/12/93	09/12/93	09/13/93
DATE ANALYZED:	09/15/93	09/15/93	09/15/93	09/15/93	09/15/93

	CRCL	SEWER	SEWER	SEWER	SEWER	SEWER
BENZENE	1	ND	ND	ND	(1.1)ND	ND
TOULENE	1	ND	ND	ND	(1.1)ND	ND
ETHYLBENZENE	1	ND	ND	ND	(1.1)ND	ND
XYLENES	1	ND	ND	ND	(1.1)ND	ND

UNITS	ug/L	ug/kg	ug/kg	ug/kg	ug/L
Level					
Dilution Factor:	1	1	1	1	1
Percent Solids, (%)	NA	NA	NA	NA	NA
Sample Weight (grams)	NA	5.0	5.0	5.0	NA

NOTE:

() DENOTES CRQL
FOR SPECIFIC SAMPLE

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

[illegible]

Summary of Analytical Results For the FS-12 Pilot Study - Soil Data

SITE:	MMR	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:	78	86	90	84	88
SAMPLE NUMBER:	WT-18-78-091293	WT-18-86-091293	WT-18-90-091293	WT-19-84-091393	WT-19-88-091393
LAB SAMPLE NO.:	15384.02	15384.03	15384.04	15384.06	15384.07
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
METHOD BLANK (MB):	BLK-091693	BLK-091693	BLK-091693	BLK-091693	BLK-091693
TRIP BLANK (TB):					
FIELD BLANK (FB):					
EQUIP. RINSEATE (ER):					
DATE SAMPLED:	09/12/93	09/12/93	09/12/93	09/13/93	09/13/93
DATE ANALYZED:	09/16/93	09/16/93	09/16/93	09/16/93	09/16/93

MDL

104

(102) 183

(108) 434

(106) 254

(105) 484

UNITS
Level
Dilution Factor:
Percent Solids, (%)
Sample Weight(grams)

mg/kg

mg/kg

mg/kg

mg/kg

mg/kg

Level
Dilution Factor:

1

1

1

1

1

Percent Solids, (%)

NA

NA

NA

NA

NA

Sample Weight(grams)

0.5

0.5

0.5

0.5

0.5

NOTE:

() DENOTES MDL
FOR THAT SPECIFIC SAMPLE

NOTE; TB NOT
ANALYZED FOR TOC

12-Apr-94

Summary of Analytical Results For the FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:	MMR
LOCATION:	FS-12
DEPTH:	92
SAMPLE NUMBER:	WT-19-92-091393
LAB SAMPLE NO.:	15384.08
MATRIX:	SOIL
METHOD BLANK (MB):	BLK-091693
TRIP BLANK (TB):	_____
FIELD BLANK (FB):	_____
EQUIP. RINSEATE (ER):	_____
DATE SAMPLED:	09/13/93
DATE ANALYZED:	09/16/93

MDL

ORGANIC CARBON	104	498
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UNITS	mg/kg
Level	_____
Dilution Factor:	1
Percent Solids, (%)	NA
Sample Weight(grams)	0.5

NOTE:

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

SITE:	MMR	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:	78	86	90	84	88
SAMPLE NUMBER:	WT-18-78-091293	WT-18-86-091293	WT-18-90-091293	WT-19-84-091393	WT-19-88-091393
LAB SAMPLE NO.:	15384.02	15384.03	15384.04	15384.06	15384.07
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
METHOD BLANK (MB):	SBLK-09169302	SBLK-09169302	SBLK-09169302	SBLK-09169302	SBLK-09169302
TRIP BLANK (TB):					
FIELD BLANK (FB):					
EQUIP. RINSEATE (ER):					
DATE SAMPLED:	09/12/93	09/12/93	09/12/93	09/13/93	09/13/93
DATE ANALYZED:	09/22/93	09/22/93	09/22/93	09/22/93	09/22/93

[illegible]

UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Level					
Dilution Factor:	1	1	1	1	1
Percent Solids, (%)	NA	NA	NA	NA	NA
Sample Weight(grams)	30g	30g	30g	30g	30g

NOTE: () DENOTES MDL
FOR THE SPECIFIC SAMPLE

NOTE; TB NOT
ANALYZED FOR TPH

NOTE: TB NOT ANALYZED FOR TPH

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

SITE: MMR
LOCATION: FS-12
DEPTH: 92
SAMPLE NUMBER: WT-19-92-091393
LAB SAMPLE NO.: 15384.08
MATRIX: SOIL
METHOD BLANK (MB): SBLK-09169302
TRIP BLANK (TB):
FIELD BLANK (FB):
EQUIP. RINSEATE (ER):
DATE SAMPLED: 09/13/93
DATE ANALYZED: 09/22/93

09/22/93

10

114

UNITS	mg/kg
Level	
Dilution Factor:	1
Percent Solids, (%)	NA
Sample Weight(grams)	30g

NOTE:

Summary of Analytical Results For the FS-12 Pilot Study - Soil Data

SITE:	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12
DEPTH:	79	87	95	
SAMPLE NUMBER:	OW-1-79-081193	OW-1-87-081493	OW-1-95-081493	TB-1-081193
LAB SAMPLE NO.:	14992.01	14992.02	14992.03	14992.04
MATRIX:	SOIL	SOIL	SOIL	WATER
METHOD BLANK (MB):	BLK-081993@1003	BLK-081993@1003	BLK-081993@1003	BLK-081993@1003
TRIP BLANK (TB):	TB-081193-1	TB-081193-1	TB-081193-1	TB-081193-1
FIELD BLANK (FB):	-----	-----	-----	-----
EQUIP. RINSEATE (ER):	-----	-----	-----	-----
DATE SAMPLED:	08/11/93	08/14/93	08/14/93	08/11/93
DATE ANALYZED:	08/19/93	08/19/93	08/19/93	08/19/93

NOTE: () DENOTES CRQL
FOR THE SPECIFIC SAMPLE

12-Apr-94

Summary of Analytical Results For the FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12
DEPTH:	79	87	95
SAMPLE NUMBER:	OW-1-79-081193	OW-1-87-081493	Ow-1-95-081493
LAB SAMPLE NO.:	14992.01	14992.02	14992.03
MATRIX:	SOIL	SOIL	SOIL
METHOD BLANK (MB):	BLK-081993@1003	BLK-081993@1003	BLK-081993@1003
TRIP BLANK (TB):	TB-081193-1	TB-081193-1	TB-081193-1
FIELD BLANK (FB):			
EQUIP. RINSEATE (ER):			
DATE SAMPLED:	08/11/93	08/14/93	08/14/93
DATE ANALYZED:	08/23/93	08/23/93	08/23/93

MDL

ORGANIC CARBON	104	563	292	(111) 300
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UNITS	mg/kg	mg/kg	mg/kg
Level			
Dilution Factor:	1	1	1250
Percent Solids, (%)	96.0	96.0	90.0
Sample Weight(grams)	0.5	0.5	0.5

NOTE:

() DENOTES MDL
FOR THE SPECIFIC SAMPLE

Summary of Analytical Results For the FS-12 Pilot Study - Soil Data

SITE:	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12
DEPTH:	79	87	95
SAMPLE NUMBER:	OW-1-79-081193	OW-1-87-081493	Ow-1-95-081493
LAB SAMPLE NO.:	14992.01	14992.02	14992.03
MATRIX:	SOIL	SOIL	SOIL
METHOD BLANK (MB):	SBLK-08199301	SBLK-08199301	SBLK-08199301
TRIP BLANK (TB):	TB-081193-1	TB-081193-1	TB-081193-1
FIELD BLANK (FB):	-----	-----	-----
EQUIP. RINSEATE (ER):	-----	-----	-----
DATE SAMPLED:	08/11/93	08/14/93	08/14/93
DATE ANALYZED:	08/19/93	08/19/93	08/19/93

NOTE: () DENOTES MDL _____
FOR THE SPECIFIC SAMPLE _____

Summary of Analytical Results For the FS-12 Pilot Study - Soil Data

SITE:	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12
DEPTH:		72	86	90
SAMPLE NUMBER:	TB-082893-1	OW-2-72-082893	OW-2-86-082993	OW-2-90-082993
LAB SAMPLE NO.:	15207.01	15207.02	15207.03	15207.04
MATRIX:	WATER	SOIL	SOIL	SOIL
METHOD BLANK (MB):	BLK-090193@0859	BLK-090193@0942	BLK-090193@0942	BLK-090193@0942
TRIP BLANK (TB):	TB-082893-1	TB-082893-1	TB-082893-1	TB-082893-1
FIELD BLANK (FB):				
EQUIP. RINSEATE (ER):				
DATE SAMPLED:	08/28/93	08/28/93	08/29/93	08/29/93
DATE ANALYZED:	09/01/93	09/01/93	09/01/93	09/01/93

BENZENE	1	ND	(1.1) ND	ND	ND
TOULENE	1	ND	(1.1) ND	ND	ND
ETHYLBENZENE	1	ND	(1.1) ND	ND	ND
XYLENES	1	ND	(1.1) ND	0.6 J B	ND

UNITS	ug/L	ug/L	ug/L	ug/L
Level				
Dilution Factor:	1	1	1	1
Percent Solids, (%)	NA	94.68	97.3	96.2
Sample Weight(grams)	NA	5.0	5.0	5.0

() DENOTES CRQL
FOR THE SPECIFIC SAMPLE

12-Apr-94

Summary of Analytical Results For the FS-12 Pilot Study - Soil Data

PILOT STUDY SOIL BORINGS

SITE:	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12
DEPTH:	72	86	90
SAMPLE NUMBER:	OW-2-72-082893	OW-2-86-082993	OW-2-90-082993
LAB SAMPLE NO.:	15207.02	15207.03	15207.04
MATRIX:	SOIL	SOIL	SOIL
METHOD BLANK (MB):	BLK-090193@0942	BLK-090193@0942	BLK-090193@0942
TRIP BLANK (TB):	_____	_____	_____
FIELD BLANK (FB):	_____	_____	_____
EQUIP. RINSEATE (ER):	_____	_____	_____
DATE SAMPLED:	08/28/93	08/29/93	08/30/93
DATE ANALYZED:	09/16/93	09/16/93	09/16/93

[illegible]

UNITS	mg/kg	mg/kg	mg/kg
Level			
Dilution Factor:	1	1	1
Percent Solids, (%)	94.68	97.3	96.2
Sample Weight(grams)	0.5	0.5	0.5

NOTE: () DENOTES MDL
FOR THE SPECIFIC SAMPLE

12-Apr-94

Summary of Engineering Parameters Analytical Results For the Sandwich Remedial Investigation Study - Soil Data

PILOT STUDY SOIL BORINGS

	MMR	MMR	MMR
SITE:	FS-12	FS-12	FS-12
LOCATION:	72	86	90
DEPTH:	OW-2-72-082893	OW-2-86-082993	OW-2-90-082993
SAMPLE NUMBER:	15207.02	15207.03	15207.04
LAB SAMPLE NO.:	SOIL	SOIL	SOIL
MATRIX:	SBLK-09019301	SBLK-09019301	SBLK-09019301
METHOD BLANK (MB):	_____	_____	_____
TRIP BLANK (TB):	_____	_____	_____
FIELD BLANK (FB):	_____	_____	_____
EQUIP. RINSEATE (ER):	_____	_____	_____
DATE SAMPLED:	08/28/93	08/29/93	08/30/93
DATE ANALYZED:	09/01/93	09/01/93	09/01/93

MDL

PETROLEUM HYDROCARBON	10	_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		(11)ND	ND	ND
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____

UNITS	mg/kg	mg/kg	mg/kg
Level	_____	_____	_____
Dilution Factor:	1	1	1
Percent Solids, (%)	94.68	97.30	96.20
Sample Weight(grams)	30g	30g	30g

NOTE: () DENOTES MDL
FOR THE SPECIFIC SAMPLE

NOTE: TB NOT ANALYZED

APPENDIX E

PRODUCT RECOVERY PILOT STUDY
WATER LEVEL DATA
AND
ASSOCIATED GRAPHS

Table E.3 Water Level Data from 66 GPM Recovery Test

				PR-1		WT-17		WT-13		OW-1		OW-2	
		Time SEC	Time Min	PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected
23-SEP-9	09:08:50,	1400	23.33	51.14	-0.126	104.61	-0.08	60.918	-0.026	90.466	0.026	89.039	0.026
23-SEP-9	09:09:10,	1420	23.67	51.148	-0.118	104.62	-0.07	60.927	-0.017	90.466	0.026	89.03	0.017
23-SEP-9	09:09:30,	1440	24.00	51.157	-0.109	104.63	-0.06	60.927	-0.017	90.466	0.026	89.03	0.017
23-SEP-9	09:09:50,	1460	24.33	51.165	-0.101	104.63	-0.06	60.927	-0.017	90.457	0.017	89.03	0.017
23-SEP-9	09:10:10,	1480	24.67	51.174	-0.092	104.64	-0.05	60.935	-0.009	90.449	0.009	89.03	0.017
23-SEP-9	09:10:30,	1500	25.00	51.174	-0.092	104.64	-0.05	60.927	-0.017	90.449	0.009	89.03	0.017
23-SEP-9	09:10:50,	1520	25.33	51.182	-0.084	104.64	-0.05	60.927	-0.017	90.449	0.009	89.039	0.026
23-SEP-9	09:11:10,	1540	25.67	51.19	-0.076	104.64	-0.05	60.935	-0.009	90.449	0.009	89.03	0.017
23-SEP-9	09:11:30,	1560	26.00	51.199	-0.067	104.65	-0.04	60.935	-0.009	90.449	0.009	89.03	0.017
23-SEP-9	09:11:50,	1580	26.33	51.207	-0.059	104.65	-0.04	60.935	-0.009	90.449	0.009	89.022	0.009
23-SEP-9	09:12:10,	1600	26.67	51.199	-0.067	104.65	-0.04	60.935	-0.009	90.44	0	89.022	0.009
23-SEP-9	09:12:30,	1620	27.00	51.216	-0.05	104.67	-0.02	60.935	-0.009	90.432	-0.008	89.022	0.009
23-SEP-9	09:12:50,	1640	27.33	51.216	-0.05	104.67	-0.02	60.935	-0.009	90.432	-0.008	89.022	0.009
23-SEP-9	09:13:10,	1660	27.67	51.216	-0.05	104.67	-0.02	60.935	-0.009	90.44	0	89.022	0.009
23-SEP-9	09:13:30,	1680	28.00	51.224	-0.042	104.68	-0.01	60.944	0	90.432	-0.008	89.022	0.009
23-SEP-9	09:13:50,	1700	28.33	51.233	-0.033	104.69	0	60.944	0	90.44	0	89.022	0.009
23-SEP-9	09:14:10,	1720	28.67	51.233	-0.033	104.69	0	60.944	0	90.449	0.009	89.013	0
23-SEP-9	09:14:30,	1740	29.00	51.241	-0.025	104.69	0	60.944	0	90.449	0.009	89.013	0
23-SEP-9	09:14:50,	1760	29.33	51.224	-0.042	104.69	0	60.944	0	90.44	0	89.013	0
23-SEP-9	09:15:10,	1780	29.67	51.241	-0.025	104.69	0	60.944	0	90.44	0	88.988	-0.025
23-SEP-9	09:15:30,	1800	30.00	51.266	0	104.7	0.01	60.944	0	90.44	0	89.013	0
23-SEP-9	09:15:50,	1820	30.33	51.266	0	104.71	0.02	60.935	-0.009	90.44	0	89.013	0
23-SEP-9	09:16:10,	1840	30.67	51.275	0.009	104.72	0.03	60.961	0.017	90.457	0.017	89.022	0.009
23-SEP-9	09:16:30,	1860	31.00	51.148	-0.118	104.63	-0.06	60.851	-0.093	90.339	-0.101	88.903	-0.11

Filename: RECOVERY.WQ1

Table E.3 Water Level Data from 66 GPM Recovery Test

			PR-1	PR-1	WT-17	WT-17	WT-13	WT-13	OW-1	OW-1	OW-2	OW-2
Time SEC Time Min			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected
23-SEP-9 08:57:10,	700	11.67	50.701	-0.565	104.23	-0.46	60.758	-0.186	90.339	-0.101	88.946	-0.067
23-SEP-9 08:57:30,	720	12.00	50.709	-0.557	104.23	-0.46	60.75	-0.194	90.347	-0.093	88.946	-0.067
23-SEP-9 08:57:50,	740	12.33	50.717	-0.549	104.25	-0.44	60.75	-0.194	90.331	-0.109	88.946	-0.067
23-SEP-9 08:58:10,	760	12.67	50.751	-0.515	104.26	-0.43	60.75	-0.194	90.339	-0.101	89.039	0.026
23-SEP-9 08:58:30,	780	13.00	50.743	-0.523	104.26	-0.43	60.75	-0.194	90.331	-0.109	88.954	-0.059
23-SEP-9 08:58:50,	800	13.33	50.743	-0.523	104.26	-0.43	60.75	-0.194	90.339	-0.101	88.937	-0.076
23-SEP-9 08:59:10,	820	13.67	50.743	-0.523	104.26	-0.43	60.75	-0.194	90.331	-0.109	88.929	-0.084
23-SEP-9 08:59:30,	840	14.00	50.76	-0.506	104.27	-0.42	60.724	-0.22	90.314	-0.126	88.929	-0.084
23-SEP-9 08:59:50,	860	14.33	50.76	-0.506	104.27	-0.42	60.724	-0.22	90.314	-0.126	88.903	-0.11
23-SEP-9 09:00:10,	880	14.67	50.793	-0.473	104.28	-0.41	60.724	-0.22	90.297	-0.143	88.929	-0.084
23-SEP-9 09:00:30,	900	15.00	50.793	-0.473	104.28	-0.41	60.724	-0.22	90.297	-0.143	88.903	-0.11
23-SEP-9 09:00:50,	920	15.33	50.785	-0.481	104.29	-0.4	60.724	-0.22	90.314	-0.126	88.912	-0.101
23-SEP-9 09:01:10,	940	15.67	50.81	-0.456	104.31	-0.38	60.733	-0.211	90.305	-0.135	88.895	-0.118
23-SEP-9 09:01:30,	960	16.00	50.802	-0.464	104.31	-0.38	60.724	-0.22	90.305	-0.135	88.912	-0.101
23-SEP-9 09:01:50,	980	16.33	50.827	-0.439	104.31	-0.38	60.724	-0.22	90.305	-0.135	88.903	-0.11
23-SEP-9 09:02:10,	1000	16.67	50.836	-0.43	104.31	-0.38	60.733	-0.211	90.305	-0.135	88.895	-0.118
23-SEP-9 09:02:30,	1020	17.00	50.827	-0.439	104.33	-0.36	60.724	-0.22	90.297	-0.143	88.903	-0.11
23-SEP-9 09:02:50,	1040	17.33	50.853	-0.413	104.33	-0.36	60.724	-0.22	90.297	-0.143	88.895	-0.118
23-SEP-9 09:03:10,	1060	17.67	50.844	-0.422	104.34	-0.35	60.724	-0.22	90.288	-0.152	88.895	-0.118
23-SEP-9 09:03:30,	1080	18.00	50.878	-0.388	104.36	-0.33	60.75	-0.194	90.288	-0.152	88.903	-0.11
23-SEP-9 09:03:50,	1100	18.33	50.895	-0.371	104.37	-0.32	60.766	-0.178	90.288	-0.152	88.903	-0.11
23-SEP-9 09:04:10,	1120	18.67	50.912	-0.354	104.38	-0.31	60.766	-0.178	90.297	-0.143	88.903	-0.11
23-SEP-9 09:04:30,	1140	19.00	50.912	-0.354	104.4	-0.29	60.766	-0.178	90.297	-0.143	88.903	-0.11
23-SEP-9 09:04:50,	1160	19.33	50.937	-0.329	104.42	-0.27	60.792	-0.152	90.297	-0.143	88.937	-0.076
23-SEP-9 09:05:10,	1180	19.67	50.954	-0.312	104.43	-0.26	60.8	-0.144	90.314	-0.126	88.937	-0.076
23-SEP-9 09:05:30,	1200	20.00	50.979	-0.287	104.45	-0.24	60.809	-0.135	90.331	-0.109	88.937	-0.076
23-SEP-9 09:05:50,	1220	20.33	50.996	-0.27	104.48	-0.21	60.809	-0.135	90.347	-0.093	88.937	-0.076
23-SEP-9 09:06:10,	1240	20.67	51.013	-0.253	104.49	-0.2	60.834	-0.11	90.356	-0.084	88.954	-0.059
23-SEP-9 09:06:30,	1260	21.00	51.03	-0.236	104.5	-0.19	60.851	-0.093	90.373	-0.067	88.946	-0.067
23-SEP-9 09:06:50,	1280	21.33	51.047	-0.219	104.52	-0.17	60.851	-0.093	90.381	-0.059	88.971	-0.042
23-SEP-9 09:07:10,	1300	21.67	51.055	-0.211	104.53	-0.16	60.859	-0.085	90.39	-0.05	88.979	-0.034
23-SEP-9 09:07:30,	1320	22.00	51.072	-0.194	104.53	-0.16	60.876	-0.068	90.407	-0.033	88.988	-0.025
23-SEP-9 09:07:50,	1340	22.33	51.089	-0.177	104.55	-0.14	60.885	-0.059	90.415	-0.025	88.996	-0.017
23-SEP-9 09:08:10,	1360	22.67	51.106	-0.16	104.58	-0.11	60.893	-0.051	90.432	-0.008	89.013	0
23-SEP-9 09:08:30,	1380	23.00	51.123	-0.143	104.59	-0.1	60.893	-0.051	90.44	0	89.022	0.009

Table E.3 Water Level Data from 66 GPM Recovery Test

	Time SEC	Time Min	PR-1	PR-1 Corrected	WT-17	WT-17 Corrected	WT-13	WT-13 Corrected	OW-1	OW-1 Corrected	OW-2	OW-2 Corrected
23-SEP-9 08:45:30,	5	0.08	23.011	-28.255	103.06	-1.63	60.462	-0.482	90.17	-0.27	88.844	-0.169
23-SEP-9 08:45:50,	20	0.33	23.045	-28.221	103.06	-1.63	60.462	-0.482	90.162	-0.278	88.819	-0.194
23-SEP-9 08:46:10,	40	0.67	23.028	-28.238	103.06	-1.63	60.454	-0.49	90.179	-0.261	88.844	-0.169
23-SEP-9 08:46:30,	60	1.00	37.409	-13.857	103.11	-1.58	60.471	-0.473	90.179	-0.261	88.844	-0.169
23-SEP-9 08:46:50,	80	1.33	47.813	-3.453	103.31	-1.38	60.505	-0.439	90.195	-0.245	88.853	-0.16
23-SEP-9 08:47:10,	100	1.67	49.307	-1.959	103.44	-1.25	60.513	-0.431	90.195	-0.245	88.853	-0.16
23-SEP-9 08:47:30,	120	2.00	49.687	-1.579	103.52	-1.17	60.538	-0.406	90.204	-0.236	88.853	-0.16
23-SEP-9 08:47:50,	140	2.33	49.848	-1.418	103.59	-1.1	60.547	-0.397	90.212	-0.228	88.861	-0.152
23-SEP-9 08:48:10,	160	2.67	49.941	-1.325	103.62	-1.07	60.564	-0.38	90.229	-0.211	88.861	-0.152
23-SEP-9 08:48:30,	180	3.00	50.017	-1.249	103.68	-1.01	60.581	-0.363	90.238	-0.202	88.861	-0.152
23-SEP-9 08:48:50,	200	3.33	50.076	-1.19	103.72	-0.97	60.589	-0.355	90.238	-0.202	88.887	-0.126
23-SEP-9 08:49:10,	220	3.67	50.109	-1.157	103.76	-0.93	60.598	-0.346	90.246	-0.194	88.895	-0.118
23-SEP-9 08:49:30,	240	4.00	50.152	-1.114	103.79	-0.9	60.606	-0.338	90.246	-0.194	88.903	-0.11
23-SEP-9 08:49:50,	260	4.33	50.219	-1.047	103.82	-0.87	60.623	-0.321	90.263	-0.177	88.912	-0.101
23-SEP-9 08:50:10,	280	4.67	50.236	-1.03	103.85	-0.84	60.631	-0.313	90.271	-0.169	88.912	-0.101
23-SEP-9 08:50:30,	300	5.00	50.278	-0.988	103.88	-0.81	60.648	-0.296	90.288	-0.152	88.929	-0.084
23-SEP-9 08:50:50,	320	5.33	50.321	-0.945	103.91	-0.78	60.665	-0.279	90.288	-0.152	88.929	-0.084
23-SEP-9 08:51:10,	340	5.67	50.363	-0.903	103.94	-0.75	60.674	-0.27	90.297	-0.143	88.954	-0.059
23-SEP-9 08:51:30,	360	6.00	50.405	-0.861	103.97	-0.72	60.682	-0.262	90.305	-0.135	88.954	-0.059
23-SEP-9 08:51:50,	380	6.33	50.43	-0.836	103.99	-0.7	60.69	-0.254	90.305	-0.135	88.946	-0.067
23-SEP-9 08:52:10,	400	6.67	50.456	-0.81	104.01	-0.68	60.682	-0.262	90.305	-0.135	88.946	-0.067
23-SEP-9 08:52:30,	420	7.00	50.464	-0.802	104.04	-0.65	60.707	-0.237	90.322	-0.118	88.971	-0.042
23-SEP-9 08:52:50,	440	7.33	50.498	-0.768	104.05	-0.64	60.724	-0.22	90.322	-0.118	88.971	-0.042
23-SEP-9 08:53:10,	460	7.67	50.506	-0.76	104.06	-0.63	60.733	-0.211	90.339	-0.101	88.971	-0.042
23-SEP-9 08:53:30,	480	8.00	50.54	-0.726	104.09	-0.6	60.733	-0.211	90.356	-0.084	88.971	-0.042
23-SEP-9 08:53:50,	500	8.33	50.557	-0.709	104.1	-0.59	60.724	-0.22	90.356	-0.084	88.971	-0.042
23-SEP-9 08:54:10,	520	8.67	50.582	-0.684	104.12	-0.57	60.724	-0.22	90.356	-0.084	88.971	-0.042
23-SEP-9 08:54:30,	540	9.00	50.599	-0.667	104.14	-0.55	60.724	-0.22	90.356	-0.084	88.979	-0.034
23-SEP-9 08:54:50,	560	9.33	50.616	-0.65	104.15	-0.54	60.724	-0.22	90.347	-0.093	88.971	-0.042
23-SEP-9 08:55:10,	580	9.67	50.616	-0.65	104.16	-0.53	60.75	-0.194	90.339	-0.101	88.979	-0.034
23-SEP-9 08:55:30,	600	10.00	50.633	-0.633	104.17	-0.52	60.75	-0.194	90.339	-0.101	88.979	-0.034
23-SEP-9 08:55:50,	620	10.33	50.658	-0.608	104.19	-0.5	60.758	-0.186	90.356	-0.084	88.971	-0.042
23-SEP-9 08:56:10,	640	10.67	50.667	-0.599	104.2	-0.49	60.758	-0.186	90.356	-0.084	88.988	-0.025
23-SEP-9 08:56:30,	660	11.00	50.684	-0.582	104.2	-0.49	60.758	-0.186	90.364	-0.076	88.979	-0.034
23-SEP-9 08:56:50,	680	11.33	50.675	-0.591	104.21	-0.48	60.758	-0.186	90.356	-0.084	88.979	-0.034

Figure E.3 66GPM Water Level Recovery
Product Recovery Pilot Study

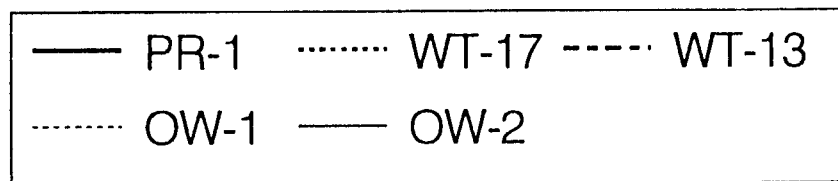
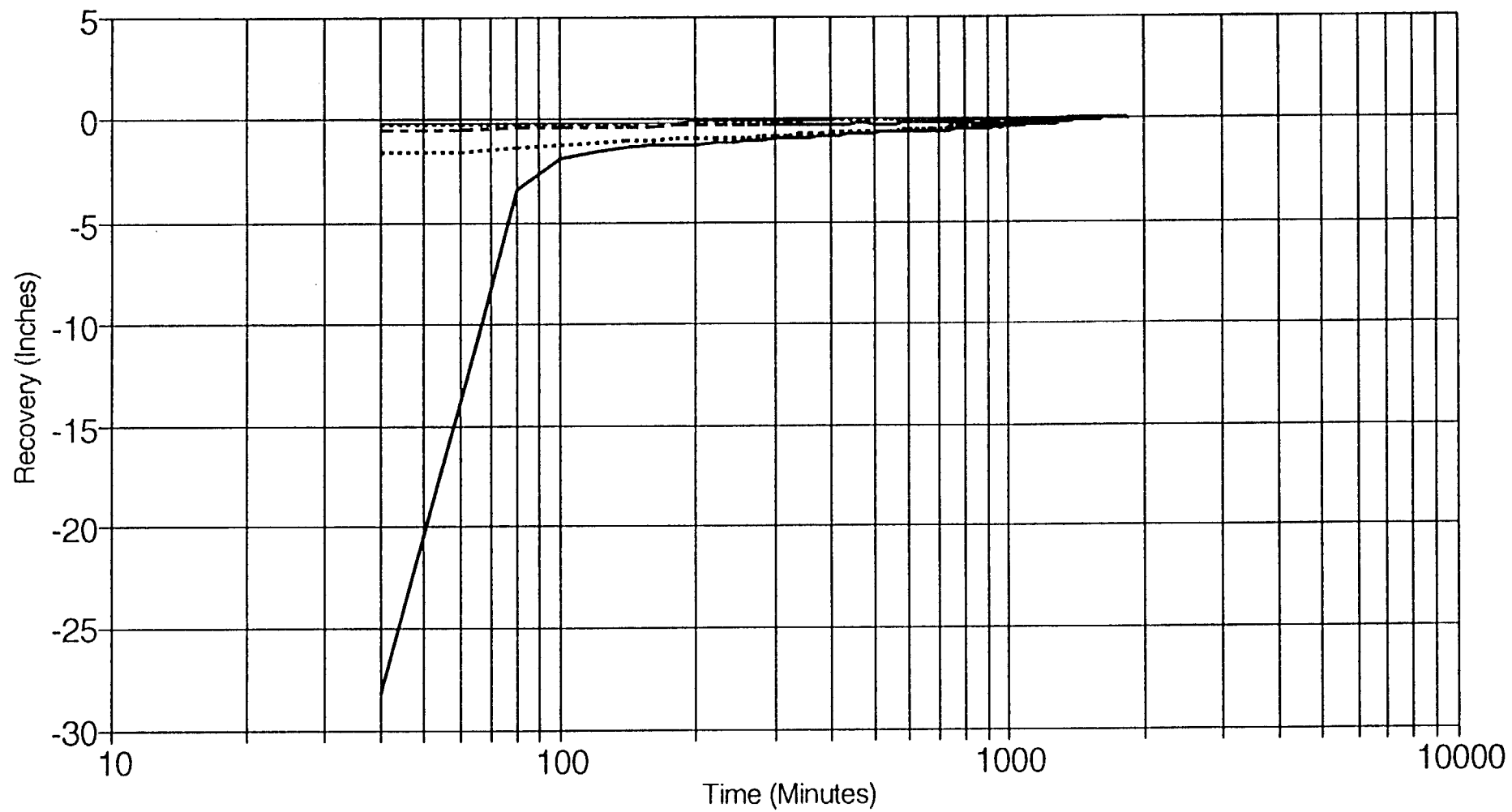


Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1			WT-17			WT-13		OW-1		OW-2	
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected	OW-2	Corrected
22-SEP-93	07:01:23	81600	22.7	23.4	-30.29	102.81	-4.12	59.964	-2.635	89.866	-2.069	88.355	-1.857	
22-SEP-93	07:06:23	81900	22.8	23.248	-30.442	102.79	-4.14	59.973	-2.626	89.849	-2.086	88.338	-1.874	
22-SEP-93	07:11:23	82200	22.8	23.341	-30.349	102.85	-4.08	60.006	-2.593	89.908	-2.027	88.397	-1.815	
22-SEP-93	07:16:23	82500	22.9	23.29	-30.4	102.8	-4.13	59.99	-2.609	89.875	-2.06	88.346	-1.866	
22-SEP-93	07:21:23	82800	23.0	23.357	-30.333	102.84	-4.09	60.015	-2.584	89.891	-2.044	88.355	-1.857	
22-SEP-93	07:26:23	83100	23.1	23.383	-30.307	102.85	-4.08	60.032	-2.567	89.9	-2.035	88.388	-1.824	
22-SEP-93	07:31:23	83400	23.2	23.391	-30.299	102.85	-4.08	60.006	-2.593	89.9	-2.035	88.38	-1.832	
22-SEP-93	07:36:23	83700	23.3	23.433	-30.257	103	-3.93	60.175	-2.424	90.043	-1.892	88.523	-1.689	
22-SEP-93	07:41:23	84000	23.3	23.383	-30.307	102.83	-4.1	60.006	-2.593	89.875	-2.06	88.355	-1.857	
22-SEP-93	07:46:23	84300	23.4	23.273	-30.417	102.81	-4.12	59.99	-2.609	89.849	-2.086	88.338	-1.874	
22-SEP-93	07:51:23	84600	23.5	23.332	-30.358	102.8	-4.13	60.006	-2.593	89.875	-2.06	88.363	-1.849	
22-SEP-93	07:56:23	84900	23.6	23.265	-30.425	102.79	-4.14	59.964	-2.635	89.849	-2.086	88.312	-1.9	
22-SEP-93	08:01:23	85200	23.7	23.324	-30.366	102.84	-4.09	60.006	-2.593	89.849	-2.086	88.38	-1.832	

Filename: TEST2.WQ1

Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1		WT-17		WT-13		OW-1		OW-2		
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected	
22-SEP-93	04:11:23	71400	19.8	23.602	-30.088	102.93	-4	60.125	-2.474	89.993	-1.942	88.464	-1.748
22-SEP-93	04:16:23	71700	19.9	23.484	-30.206	102.91	-4.02	60.091	-2.508	89.967	-1.968	88.439	-1.773
22-SEP-93	04:21:23	72000	20.0	23.594	-30.096	102.93	-4	60.091	-2.508	90.001	-1.934	88.481	-1.731
22-SEP-93	04:26:23	72300	20.1	23.518	-30.172	102.89	-4.04	60.082	-2.517	89.959	-1.976	88.431	-1.781
22-SEP-93	04:31:23	72600	20.2	23.552	-30.138	102.97	-3.96	60.167	-2.432	90.043	-1.892	88.515	-1.697
22-SEP-93	04:36:23	72900	20.3	23.594	-30.096	102.96	-3.97	60.133	-2.466	89.993	-1.942	88.473	-1.739
22-SEP-93	04:41:23	73200	20.3	23.383	-30.307	102.83	-4.1	60.006	-2.593	89.875	-2.06	88.363	-1.849
22-SEP-93	04:46:23	73500	20.4	23.467	-30.223	102.8	-4.13	60.006	-2.593	89.942	-1.993	88.388	-1.824
22-SEP-93	04:51:23	73800	20.5	23.484	-30.206	102.91	-4.02	60.099	-2.5	89.976	-1.959	88.523	-1.689
22-SEP-93	04:56:23	74100	20.6	23.535	-30.155	102.89	-4.04	60.082	-2.517	89.959	-1.976	88.439	-1.773
22-SEP-93	05:01:23	74400	20.7	23.501	-30.189	102.89	-4.04	60.049	-2.55	90.06	-1.875	88.422	-1.79
22-SEP-93	05:06:23	74700	20.8	23.366	-30.324	102.85	-4.08	60.006	-2.593	89.9	-2.035	88.355	-1.857
22-SEP-93	05:11:23	75000	20.8	23.535	-30.155	102.93	-4	60.099	-2.5	89.976	-1.959	88.447	-1.765
22-SEP-93	05:16:23	75300	20.9	23.442	-30.248	102.88	-4.05	60.049	-2.55	89.925	-2.01	88.405	-1.807
22-SEP-93	05:21:23	75600	21.0	23.509	-30.181	102.91	-4.02	60.082	-2.517	89.959	-1.976	88.439	-1.773
22-SEP-93	05:26:23	75900	21.1	23.4	-30.29	102.88	-4.05	60.04	-2.559	89.951	-1.984	88.397	-1.815
22-SEP-93	05:31:23	76200	21.2	23.476	-30.214	102.87	-4.06	60.04	-2.559	89.917	-2.018	88.388	-1.824
22-SEP-93	05:36:23	76500	21.3	23.4	-30.29	102.85	-4.08	60.032	-2.567	89.908	-2.027	88.388	-1.824
22-SEP-93	05:41:23	76800	21.3	23.509	-30.181	102.91	-4.02	60.082	-2.517	89.959	-1.976	88.447	-1.765
22-SEP-93	05:46:23	77100	21.4	23.425	-30.265	102.85	-4.08	60.006	-2.593	89.908	-2.027	88.38	-1.832
22-SEP-93	05:51:23	77400	21.5	23.493	-30.197	102.93	-4	60.116	-2.483	90.001	-1.934	88.473	-1.739
22-SEP-93	05:56:23	77700	21.6	23.425	-30.265	102.85	-4.08	60.006	-2.593	89.9	-2.035	88.38	-1.832
22-SEP-93	06:01:23	78000	21.7	23.383	-30.307	102.85	-4.08	60.057	-2.542	89.9	-2.035	88.38	-1.832
22-SEP-93	06:06:23	78300	21.8	23.501	-30.189	102.91	-4.02	60.082	-2.517	89.967	-1.968	88.431	-1.781
22-SEP-93	06:11:23	78600	21.8	23.357	-30.333	102.85	-4.08	60.006	-2.593	89.967	-1.968	88.431	-1.781
22-SEP-93	06:16:23	78900	21.9	23.391	-30.299	102.8	-4.13	59.964	-2.635	89.866	-2.069	88.338	-1.874
22-SEP-93	06:21:23	79200	22.0	23.374	-30.316	102.83	-4.1	59.998	-2.601	89.875	-2.06	88.38	-1.832
22-SEP-93	06:26:23	79500	22.1	23.476	-30.214	102.94	-3.99	60.091	-2.508	89.984	-1.951	88.473	-1.739
22-SEP-93	06:31:23	79800	22.2	23.391	-30.299	102.9	-4.03	60.049	-2.55	89.942	-1.993	88.397	-1.815
22-SEP-93	06:36:23	80100	22.3	23.433	-30.257	102.92	-4.01	60.091	-2.508	89.967	-1.968	88.447	-1.765
22-SEP-93	06:41:23	80400	22.3	23.425	-30.265	102.85	-4.08	60.015	-2.584	89.9	-2.035	88.388	-1.824
22-SEP-93	06:46:23	80700	22.4	23.332	-30.358	102.8	-4.13	59.998	-2.601	89.875	-2.06	88.355	-1.857
22-SEP-93	06:51:23	81000	22.5	23.484	-30.206	102.93	-4	60.091	-2.508	89.993	-1.942	88.473	-1.739
22-SEP-93	06:56:23	81300	22.6	23.324	-30.366	102.81	-4.12	59.99	-2.609	89.875	-2.06	88.355	-1.857

Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1		WT-17		WT-13		OW-1		OW-2		
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected	
22-SEP-93	01:21:23	61200	17.0	23.754	-29.936	102.97	-3.96	60.201	-2.398	90.035	-1.9	88.515	-1.697
22-SEP-93	01:26:23	61500	17.1	23.805	-29.885	103.02	-3.91	60.218	-2.381	90.077	-1.858	88.549	-1.663
22-SEP-93	01:31:23	61800	17.2	23.83	-29.86	103.02	-3.91	60.218	-2.381	90.077	-1.858	88.549	-1.663
22-SEP-93	01:36:23	62100	17.3	23.788	-29.902	103.02	-3.91	60.218	-2.381	90.069	-1.866	88.549	-1.663
22-SEP-93	01:41:23	62400	17.3	23.67	-30.02	103.02	-3.91	60.226	-2.373	90.069	-1.866	88.557	-1.655
22-SEP-93	01:46:23	62700	17.4	23.763	-29.927	102.97	-3.96	60.175	-2.424	90.01	-1.925	88.49	-1.722
22-SEP-93	01:51:23	63000	17.5	23.763	-29.927	103	-3.93	60.201	-2.398	90.035	-1.9	88.515	-1.697
22-SEP-93	01:56:23	63300	17.6	23.67	-30.02	103	-3.93	60.209	-2.39	90.035	-1.9	88.523	-1.689
22-SEP-93	02:01:23	63600	17.7	23.746	-29.944	102.96	-3.97	60.167	-2.432	90.001	-1.934	88.481	-1.731
22-SEP-93	02:06:23	63900	17.8	23.678	-30.012	102.96	-3.97	60.167	-2.432	90.001	-1.934	88.481	-1.731
22-SEP-93	02:11:23	64200	17.8	23.695	-29.995	102.93	-4	60.158	-2.441	89.993	-1.942	88.473	-1.739
22-SEP-93	02:16:23	64500	17.9	23.67	-30.02	102.96	-3.97	60.167	-2.432	90.001	-1.934	88.49	-1.722
22-SEP-93	02:21:23	64800	18.0	23.678	-30.012	103	-3.93	60.201	-2.398	90.035	-1.9	88.523	-1.689
22-SEP-93	02:26:23	65100	18.1	23.754	-29.936	102.97	-3.96	60.175	-2.424	90.027	-1.908	88.481	-1.731
22-SEP-93	02:31:23	65400	18.2	23.83	-29.86	103.09	-3.84	60.294	-2.305	90.136	-1.799	88.608	-1.604
22-SEP-93	02:36:23	65700	18.3	23.687	-30.003	102.96	-3.97	60.158	-2.441	90.01	-1.925	88.473	-1.739
22-SEP-93	02:41:23	66000	18.3	23.661	-30.029	102.94	-3.99	60.142	-2.457	89.984	-1.951	88.439	-1.773
22-SEP-93	02:46:23	66300	18.4	23.636	-30.054	103.01	-3.92	60.218	-2.381	90.069	-1.866	88.523	-1.689
22-SEP-93	02:51:23	66600	18.5	23.78	-29.91	103.06	-3.87	60.268	-2.331	90.17	-1.765	88.591	-1.621
22-SEP-93	02:56:23	66900	18.6	23.611	-30.079	102.94	-3.99	60.142	-2.457	89.993	-1.942	88.523	-1.689
22-SEP-93	03:01:23	67200	18.7	23.569	-30.121	102.94	-3.99	60.142	-2.457	89.993	-1.942	88.464	-1.748
22-SEP-93	03:06:23	67500	18.8	23.678	-30.012	102.97	-3.96	60.184	-2.415	90.035	-1.9	88.515	-1.697
22-SEP-93	03:11:23	67800	18.8	23.569	-30.121	102.89	-4.04	60.099	-2.5	89.942	-1.993	88.532	-1.68
22-SEP-93	03:16:23	68100	18.9	23.552	-30.138	102.92	-4.01	60.125	-2.474	89.959	-1.976	88.439	-1.773
22-SEP-93	03:21:23	68400	19.0	23.619	-30.071	102.93	-4	60.125	-2.474	89.976	-1.959	88.439	-1.773
22-SEP-93	03:26:23	68700	19.1	23.509	-30.181	102.91	-4.02	60.116	-2.483	89.976	-1.959	88.481	-1.731
22-SEP-93	03:31:23	69000	19.2	23.645	-30.045	102.93	-4	60.125	-2.474	89.976	-1.959	88.447	-1.765
22-SEP-93	03:36:23	69300	19.3	23.509	-30.181	102.89	-4.04	60.091	-2.508	89.951	-1.984	88.431	-1.781
22-SEP-93	03:41:23	69600	19.3	23.636	-30.054	102.93	-4	60.125	-2.474	89.967	-1.968	88.447	-1.765
22-SEP-93	03:46:23	69900	19.4	23.569	-30.121	102.9	-4.03	60.082	-2.517	89.984	-1.951	88.439	-1.773
22-SEP-93	03:51:23	70200	19.5	23.569	-30.121	102.96	-3.97	60.133	-2.466	90.01	-1.925	88.473	-1.739
22-SEP-93	03:56:23	70500	19.6	23.577	-30.113	102.91	-4.02	60.099	-2.5	89.959	-1.976	88.566	-1.646
22-SEP-93	04:01:23	70800	19.7	23.509	-30.181	102.88	-4.05	60.049	-2.55	89.925	-2.01	88.405	-1.807
22-SEP-93	04:06:23	71100	19.8	23.526	-30.164	102.9	-4.03	60.082	-2.517	89.951	-1.984	88.439	-1.773

Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1		WT-17		WT-13		OW-1		OW-2		
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected	
21-SEP-93	22:31:23	51000	14.2	23.923	-29.767	103.01	-3.92	60.201	-2.398	90.052	-1.883	88.523	-1.689
21-SEP-93	22:36:23	51300	14.3	23.982	-29.708	103	-3.93	60.201	-2.398	90.043	-1.892	88.532	-1.68
21-SEP-93	22:41:23	51600	14.3	23.965	-29.725	103.01	-3.92	60.226	-2.373	90.077	-1.858	88.557	-1.655
21-SEP-93	22:46:23	51900	14.4	23.991	-29.699	103.06	-3.87	60.251	-2.348	90.103	-1.832	88.566	-1.646
21-SEP-93	22:51:23	52200	14.5	23.923	-29.767	102.97	-3.96	60.184	-2.415	90.027	-1.908	88.515	-1.697
21-SEP-93	22:56:23	52500	14.6	23.839	-29.851	103	-3.93	60.201	-2.398	90.043	-1.892	88.532	-1.68
21-SEP-93	23:01:23	52800	14.7	23.949	-29.741	103.05	-3.88	60.251	-2.348	90.094	-1.841	88.574	-1.638
21-SEP-93	23:06:23	53100	14.8	23.864	-29.826	103.01	-3.92	60.218	-2.381	90.06	-1.875	88.523	-1.689
21-SEP-93	23:11:23	53400	14.8	23.949	-29.741	103.06	-3.87	60.26	-2.339	90.103	-1.832	88.608	-1.604
21-SEP-93	23:16:23	53700	14.9	23.94	-29.75	103.01	-3.92	60.209	-2.39	90.06	-1.875	88.523	-1.689
21-SEP-93	23:21:23	54000	15.0	23.906	-29.784	103.01	-3.92	60.209	-2.39	90.06	-1.875	88.523	-1.689
21-SEP-93	23:26:23	54300	15.1	23.957	-29.733	103.01	-3.92	60.218	-2.381	90.094	-1.841	88.523	-1.689
21-SEP-93	23:31:23	54600	15.2	24.075	-29.615	103.11	-3.82	60.302	-2.297	90.145	-1.79	88.65	-1.562
21-SEP-93	23:36:23	54900	15.3	23.949	-29.741	103.06	-3.87	60.26	-2.339	90.094	-1.841	88.566	-1.646
21-SEP-93	23:41:23	55200	15.3	23.965	-29.725	103.06	-3.87	60.26	-2.339	90.103	-1.832	88.566	-1.646
21-SEP-93	23:46:23	55500	15.4	23.898	-29.792	103.05	-3.88	60.251	-2.348	90.094	-1.841	88.574	-1.638
21-SEP-93	23:51:23	55800	15.5	23.737	-29.953	103.01	-3.92	60.226	-2.373	90.06	-1.875	88.549	-1.663
21-SEP-93	23:56:23	56100	15.6	23.771	-29.919	103.01	-3.92	60.218	-2.381	90.052	-1.883	88.532	-1.68
22-SEP-93	00:01:23	56400	15.7	23.847	-29.843	103	-3.93	60.209	-2.39	90.052	-1.883	88.523	-1.689
22-SEP-93	00:06:23	56700	15.8	23.813	-29.877	103.06	-3.87	60.285	-2.314	90.128	-1.807	88.599	-1.613
22-SEP-93	00:11:23	57000	15.8	23.813	-29.877	103.01	-3.92	60.218	-2.381	90.094	-1.841	88.549	-1.663
22-SEP-93	00:16:23	57300	15.9	23.78	-29.91	103.01	-3.92	60.226	-2.373	90.069	-1.866	88.549	-1.663
22-SEP-93	00:21:23	57600	16.0	23.797	-29.893	103.05	-3.88	60.268	-2.331	90.111	-1.824	88.591	-1.621
22-SEP-93	00:26:23	57900	16.1	23.746	-29.944	103.01	-3.92	60.209	-2.39	90.052	-1.883	88.532	-1.68
22-SEP-93	00:31:23	58200	16.2	23.754	-29.936	103.01	-3.92	60.209	-2.39	90.043	-1.892	88.532	-1.68
22-SEP-93	00:36:23	58500	16.3	23.721	-29.969	103	-3.93	60.209	-2.39	90.043	-1.892	88.523	-1.689
22-SEP-93	00:41:23	58800	16.3	23.721	-29.969	102.98	-3.95	60.201	-2.398	90.043	-1.892	88.557	-1.655
22-SEP-93	00:46:23	59100	16.4	23.763	-29.927	103	-3.93	60.209	-2.39	90.052	-1.883	88.523	-1.689
22-SEP-93	00:51:23	59400	16.5	23.636	-30.054	102.97	-3.96	60.175	-2.424	90.018	-1.917	88.481	-1.731
22-SEP-93	00:56:23	59700	16.6	23.695	-29.995	102.96	-3.97	60.184	-2.415	90.01	-1.925	88.481	-1.731
22-SEP-93	01:01:23	60000	16.7	23.653	-30.037	102.97	-3.96	60.201	-2.398	90.035	-1.9	88.515	-1.697
22-SEP-93	01:06:23	60300	16.8	23.805	-29.885	102.96	-3.97	60.175	-2.424	90.018	-1.917	88.507	-1.705
22-SEP-93	01:11:23	60600	16.8	23.712	-29.978	102.97	-3.96	60.184	-2.415	90.052	-1.883	88.507	-1.705
22-SEP-93	01:16:23	60900	16.9	23.729	-29.961	103	-3.93	60.209	-2.39	90.043	-1.892	88.523	-1.689

Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1			WT-17			WT-13		OW-1		OW-2	
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected		
21-SEP-93	19:41:23	40800	11.3	24.455	-29.235	103.12	-3.81	60.294	-2.305	90.179	-1.756	88.659	-1.553	
21-SEP-93	19:46:23	41100	11.4	24.405	-29.285	103.11	-3.82	60.26	-2.339	90.153	-1.782	88.642	-1.57	
21-SEP-93	19:51:23	41400	11.5	24.447	-29.243	103.11	-3.82	60.268	-2.331	90.136	-1.799	88.633	-1.579	
21-SEP-93	19:56:23	41700	11.6	24.329	-29.361	103.06	-3.87	60.243	-2.356	90.119	-1.816	88.599	-1.613	
21-SEP-93	20:01:23	42000	11.7	24.337	-29.353	103.05	-3.88	60.218	-2.381	90.103	-1.832	88.566	-1.646	
21-SEP-93	20:06:23	42300	11.8	24.286	-29.404	103.05	-3.88	60.218	-2.381	90.094	-1.841	88.574	-1.638	
21-SEP-93	20:11:23	42600	11.8	24.337	-29.353	103.06	-3.87	60.251	-2.348	90.128	-1.807	88.608	-1.604	
21-SEP-93	20:16:23	42900	11.9	24.244	-29.446	103.08	-3.85	60.26	-2.339	90.136	-1.799	88.608	-1.604	
21-SEP-93	20:21:23	43200	12.0	24.303	-29.387	103.09	-3.84	60.294	-2.305	90.136	-1.799	88.608	-1.604	
21-SEP-93	20:26:23	43500	12.1	24.253	-29.437	103.06	-3.87	60.243	-2.356	90.111	-1.824	88.599	-1.613	
21-SEP-93	20:31:23	43800	12.2	24.236	-29.454	103.05	-3.88	60.226	-2.373	90.094	-1.841	88.566	-1.646	
21-SEP-93	20:36:23	44100	12.3	24.193	-29.497	103.08	-3.85	60.26	-2.339	90.128	-1.807	88.616	-1.596	
21-SEP-93	20:41:23	44400	12.3	24.151	-29.539	103.06	-3.87	60.218	-2.381	90.111	-1.824	88.591	-1.621	
21-SEP-93	20:46:23	44700	12.4	24.219	-29.471	103.13	-3.8	60.302	-2.297	90.17	-1.765	88.65	-1.562	
21-SEP-93	20:51:23	45000	12.5	24.253	-29.437	103.06	-3.87	60.251	-2.348	90.103	-1.832	88.65	-1.562	
21-SEP-93	20:56:23	45300	12.6	24.219	-29.471	103.06	-3.87	60.251	-2.348	90.119	-1.816	88.599	-1.613	
21-SEP-93	21:01:23	45600	12.7	24.177	-29.513	103.06	-3.87	60.243	-2.356	90.111	-1.824	88.591	-1.621	
21-SEP-93	21:06:23	45900	12.8	24.21	-29.48	103.12	-3.81	60.302	-2.297	90.17	-1.765	88.659	-1.553	
21-SEP-93	21:11:23	46200	12.8	24.075	-29.615	103.04	-3.89	60.226	-2.373	90.077	-1.858	88.566	-1.646	
21-SEP-93	21:16:23	46500	12.9	24.134	-29.556	103.06	-3.87	60.243	-2.356	90.103	-1.832	88.566	-1.646	
21-SEP-93	21:21:23	46800	13.0	24.177	-29.513	103.05	-3.88	60.226	-2.373	90.094	-1.841	88.574	-1.638	
21-SEP-93	21:26:23	47100	13.1	24.067	-29.623	103.02	-3.91	60.201	-2.398	90.06	-1.875	88.523	-1.689	
21-SEP-93	21:31:23	47400	13.2	23.991	-29.699	103.01	-3.92	60.226	-2.373	90.077	-1.858	88.566	-1.646	
21-SEP-93	21:36:23	47700	13.3	24.075	-29.615	103.06	-3.87	60.251	-2.348	90.145	-1.79	88.599	-1.613	
21-SEP-93	21:41:23	48000	13.3	24.109	-29.581	103.04	-3.89	60.226	-2.373	90.086	-1.849	88.566	-1.646	
21-SEP-93	21:46:23	48300	13.4	24.117	-29.573	103.08	-3.85	60.26	-2.339	90.119	-1.816	88.608	-1.604	
21-SEP-93	21:51:23	48600	13.5	24.075	-29.615	103.06	-3.87	60.26	-2.339	90.111	-1.824	88.599	-1.613	
21-SEP-93	21:56:23	48900	13.6	24.117	-29.573	103.06	-3.87	60.243	-2.356	90.103	-1.832	88.591	-1.621	
21-SEP-93	22:01:23	49200	13.7	24.075	-29.615	103.05	-3.88	60.218	-2.381	90.094	-1.841	88.566	-1.646	
21-SEP-93	22:06:23	49500	13.8	24.075	-29.615	103.05	-3.88	60.218	-2.381	90.094	-1.841	88.675	-1.537	
21-SEP-93	22:11:23	49800	13.8	23.949	-29.741	103.04	-3.89	60.226	-2.373	90.077	-1.858	88.557	-1.655	
21-SEP-93	22:16:23	50100	13.9	23.94	-29.75	103.04	-3.89	60.226	-2.373	90.077	-1.858	88.574	-1.638	
21-SEP-93	22:21:23	50400	14.0	24.025	-29.665	103.01	-3.92	60.201	-2.398	90.153	-1.782	88.532	-1.68	
21-SEP-93	22:26:23	50700	14.1	23.906	-29.784	102.97	-3.96	60.175	-2.424	90.027	-1.908	88.523	-1.689	

Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1		WT-17		WT-13		OW-1		OW-2		
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected	
21-SEP-93	16:51:23	30600	8.5	25.097	-28.593	103.14	-3.79	60.302	-2.297	90.255	-1.68	88.735	-1.477
21-SEP-93	16:56:23	30900	8.6	25.013	-28.677	103.13	-3.8	60.302	-2.297	90.221	-1.714	88.701	-1.511
21-SEP-93	17:01:23	31200	8.7	24.962	-28.728	103.13	-3.8	60.268	-2.331	90.212	-1.723	88.701	-1.511
21-SEP-93	17:06:23	31500	8.8	24.92	-28.77	103.12	-3.81	60.26	-2.339	90.187	-1.748	88.692	-1.52
21-SEP-93	17:11:23	31800	8.8	24.709	-28.981	103.14	-3.79	60.285	-2.314	90.212	-1.723	88.701	-1.511
21-SEP-93	17:16:23	32100	8.9	24.962	-28.728	103.18	-3.75	60.302	-2.297	90.246	-1.689	88.743	-1.469
21-SEP-93	17:21:23	32400	9.0	24.869	-28.821	103.19	-3.74	60.327	-2.272	90.246	-1.689	88.743	-1.469
21-SEP-93	17:26:23	32700	9.1	24.861	-28.829	103.17	-3.76	60.31	-2.289	90.229	-1.706	88.735	-1.477
21-SEP-93	17:31:23	33000	9.2	24.818	-28.872	103.18	-3.75	60.302	-2.297	90.229	-1.706	88.726	-1.486
21-SEP-93	17:36:23	33300	9.3	24.827	-28.863	103.18	-3.75	60.336	-2.263	90.255	-1.68	88.735	-1.477
21-SEP-93	17:41:23	33600	9.3	24.835	-28.855	103.18	-3.75	60.336	-2.263	90.246	-1.689	88.735	-1.477
21-SEP-93	17:46:23	33900	9.4	24.742	-28.948	103.14	-3.79	60.294	-2.305	90.195	-1.74	88.684	-1.528
21-SEP-93	17:51:23	34200	9.5	24.717	-28.973	103.15	-3.78	60.294	-2.305	90.195	-1.74	88.684	-1.528
21-SEP-93	17:56:23	34500	9.6	24.709	-28.981	103.13	-3.8	60.26	-2.339	90.179	-1.756	88.675	-1.537
21-SEP-93	18:01:23	34800	9.7	24.658	-29.032	103.17	-3.76	60.31	-2.289	90.204	-1.731	88.701	-1.511
21-SEP-93	18:06:23	35100	9.8	24.692	-28.998	103.13	-3.8	60.285	-2.314	90.17	-1.765	88.659	-1.553
21-SEP-93	18:11:23	35400	9.8	24.649	-29.041	103.12	-3.81	60.268	-2.331	90.17	-1.765	88.659	-1.553
21-SEP-93	18:16:23	35700	9.9	24.582	-29.108	103.12	-3.81	60.26	-2.339	90.179	-1.756	88.65	-1.562
21-SEP-93	18:21:23	36000	10.0	24.573	-29.117	103.12	-3.81	60.26	-2.339	90.179	-1.756	88.65	-1.562
21-SEP-93	18:26:23	36300	10.1	24.582	-29.108	103.12	-3.81	60.26	-2.339	90.162	-1.773	88.659	-1.553
21-SEP-93	18:31:23	36600	10.2	24.607	-29.083	103.1	-3.83	60.26	-2.339	90.17	-1.765	88.65	-1.562
21-SEP-93	18:36:23	36900	10.3	24.59	-29.1	103.14	-3.79	60.302	-2.297	90.195	-1.74	88.675	-1.537
21-SEP-93	18:41:23	37200	10.3	24.514	-29.176	103.14	-3.79	60.31	-2.289	90.204	-1.731	88.684	-1.528
21-SEP-93	18:46:23	37500	10.4	24.531	-29.159	103.12	-3.81	60.285	-2.314	90.17	-1.765	88.659	-1.553
21-SEP-93	18:51:23	37800	10.5	24.548	-29.142	103.1	-3.83	60.26	-2.339	90.162	-1.773	88.65	-1.562
21-SEP-93	18:56:23	38100	10.6	24.531	-29.159	103.1	-3.83	60.26	-2.339	90.162	-1.773	88.642	-1.57
21-SEP-93	19:01:23	38400	10.7	24.497	-29.193	103.1	-3.83	60.268	-2.331	90.145	-1.79	88.633	-1.579
21-SEP-93	19:06:23	38700	10.8	24.379	-29.311	103.1	-3.83	60.26	-2.339	90.145	-1.79	88.633	-1.579
21-SEP-93	19:11:23	39000	10.8	24.388	-29.302	103.1	-3.83	60.26	-2.339	90.145	-1.79	88.633	-1.579
21-SEP-93	19:16:23	39300	10.9	24.455	-29.235	103.12	-3.81	60.285	-2.314	90.179	-1.756	88.659	-1.553
21-SEP-93	19:21:23	39600	11.0	24.43	-29.26	103.1	-3.83	60.26	-2.339	90.145	-1.79	88.692	-1.52
21-SEP-93	19:26:23	39900	11.1	24.329	-29.361	103.1	-3.83	60.26	-2.339	90.145	-1.79	88.701	-1.511
21-SEP-93	19:31:23	40200	11.2	24.286	-29.404	103.09	-3.84	60.251	-2.348	90.128	-1.807	88.616	-1.596
21-SEP-93	19:36:23	40500	11.3	24.421	-29.269	103.11	-3.82	60.268	-2.331	90.153	-1.782	88.675	-1.537

Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1		WT-17		WT-13		OW-1		OW-2	
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected
21-SEP-93	14:01:23	20400	5.7	15.107	-38.583	102.72	-4.21	60.42	-2.179	90.407	-1.528	88.861
21-SEP-93	14:06:23	20700	5.8	15.175	-38.515	102.74	-4.19	60.437	-2.162	90.449	-1.486	88.946
21-SEP-93	14:11:23	21000	5.8	15.09	-38.6	102.73	-4.2	60.429	-2.17	90.423	-1.512	88.903
21-SEP-93	14:16:23	21300	5.9	15.149	-38.541	102.74	-4.19	60.412	-2.187	90.415	-1.52	88.903
21-SEP-93	14:21:23	21600	6.0	15.158	-38.532	102.72	-4.21	60.42	-2.179	90.457	-1.478	88.929
21-SEP-93	14:26:23	21900	6.1	15.048	-38.642	102.68	-4.25	60.378	-2.221	90.398	-1.537	88.895
21-SEP-93	14:31:23	22200	6.2	15.107	-38.583	102.68	-4.25	60.395	-2.204	90.407	-1.528	88.903
21-SEP-93	14:36:23	22500	6.3	15.082	-38.608	102.67	-4.26	60.37	-2.229	90.39	-1.545	88.861
21-SEP-93	14:41:23	22800	6.3	14.938	-38.752	102.63	-4.3	60.336	-2.263	90.364	-1.571	88.853
21-SEP-93	14:46:23	23100	6.4	15.006	-38.684	102.62	-4.31	60.302	-2.297	90.339	-1.596	88.819
21-SEP-93	14:51:23	23400	6.5	14.972	-38.718	102.64	-4.29	60.327	-2.272	90.364	-1.571	88.861
21-SEP-93	14:56:23	23700	6.6	15.04	-38.65	102.59	-4.34	60.31	-2.289	90.339	-1.596	88.853
21-SEP-93	15:01:23	24000	6.7	14.972	-38.718	102.59	-4.34	60.294	-2.305	90.331	-1.604	88.819
21-SEP-93	15:06:23	24300	6.8	14.938	-38.752	102.58	-4.35	60.285	-2.314	90.314	-1.621	88.802
21-SEP-93	15:11:23	24600	6.8	14.921	-38.769	102.58	-4.35	60.268	-2.331	90.297	-1.638	88.777
21-SEP-93	15:16:23	24900	6.9	14.795	-38.895	102.55	-4.38	60.243	-2.356	90.271	-1.664	88.802
21-SEP-93	15:21:23	25200	7.0	14.508	-39.182	102.54	-4.39	60.243	-2.356	90.271	-1.664	88.785
21-SEP-93	15:26:23	25500	7.1	10.564	-43.126	102.53	-4.4	60.226	-2.373	90.263	-1.672	88.768
21-SEP-93	15:31:23	25800	7.2	10.606	-43.084	102.52	-4.41	60.209	-2.39	90.246	-1.689	88.735
21-SEP-93	15:36:23	26100	7.3	10.598	-43.092	102.51	-4.42	60.226	-2.373	90.246	-1.689	88.768
21-SEP-93	15:41:23	26400	7.3	10.556	-43.134	102.51	-4.42	60.201	-2.398	90.229	-1.706	88.735
21-SEP-93	15:46:23	26700	7.4	14.82	-38.87	102.5	-4.43	60.175	-2.424	90.238	-1.697	88.768
21-SEP-93	15:51:23	27000	7.5	14.896	-38.794	102.49	-4.44	60.175	-2.424	90.229	-1.706	88.819
21-SEP-93	15:56:23	27300	7.6	14.888	-38.802	102.47	-4.46	60.175	-2.424	90.229	-1.706	88.743
21-SEP-93	16:01:23	27600	7.7	20.174	-33.516	102.63	-4.3	60.209	-2.39	90.229	-1.706	88.735
21-SEP-93	16:06:23	27900	7.8	24.962	-28.728	102.8	-4.13	60.218	-2.381	90.255	-1.68	88.76
21-SEP-93	16:11:23	28200	7.8	25.046	-28.644	102.89	-4.04	60.226	-2.373	90.221	-1.714	88.718
21-SEP-93	16:16:23	28500	7.9	25.097	-28.593	102.94	-3.99	60.226	-2.373	90.229	-1.706	88.735
21-SEP-93	16:21:23	28800	8.0	25.114	-28.576	103.05	-3.88	60.26	-2.339	90.246	-1.689	88.76
21-SEP-93	16:26:23	29100	8.1	25.122	-28.568	103.06	-3.87	60.268	-2.331	90.255	-1.68	88.76
21-SEP-93	16:31:23	29400	8.2	25.131	-28.559	103.1	-3.83	60.285	-2.314	90.255	-1.68	88.735
21-SEP-93	16:36:23	29700	8.3	25.055	-28.635	103.1	-3.83	60.26	-2.339	90.229	-1.706	88.743
21-SEP-93	16:41:23	30000	8.3	25.013	-28.677	103.1	-3.83	60.26	-2.339	90.204	-1.731	88.692
21-SEP-93	16:46:23	30300	8.4	25.055	-28.635	103.14	-3.79	60.294	-2.305	90.246	-1.689	88.735

Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1			WT-17			WT-13			OW-1			OW-2		
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected	OW-2	Corrected			
21-SEP-93	11:11:23	10200	2.8	15.85	-37.84	103.31	-3.62	60.978	-1.621	90.896	-1.039	89.3	-0.912				
21-SEP-93	11:16:23	10500	2.9	15.766	-37.924	103.23	-3.7	60.935	-1.664	90.812	-1.123	89.283	-0.929				
21-SEP-93	11:21:23	10800	3.0	15.707	-37.983	103.27	-3.66	60.961	-1.638	90.846	-1.089	89.351	-0.861				
21-SEP-93	11:26:23	11100	3.1	15.698	-37.992	103.23	-3.7	60.927	-1.672	90.753	-1.182	89.241	-0.971				
21-SEP-93	11:31:23	11400	3.2	15.664	-38.026	103.27	-3.66	60.935	-1.664	90.863	-1.072	89.343	-0.869				
21-SEP-93	11:36:23	11700	3.3	15.529	-38.161	103.19	-3.74	60.876	-1.723	90.778	-1.157	89.241	-0.971				
21-SEP-93	11:41:23	12000	3.3	15.512	-38.178	103.17	-3.76	60.851	-1.748	90.77	-1.165	89.275	-0.937				
21-SEP-93	11:46:23	12300	3.4	15.42	-38.27	103.18	-3.75	60.851	-1.748	90.787	-1.148	89.267	-0.945				
21-SEP-93	11:51:23	12600	3.5	15.428	-38.262	103.17	-3.76	60.851	-1.748	90.778	-1.157	89.283	-0.929				
21-SEP-93	11:56:23	12900	3.6	15.403	-38.287	103.15	-3.78	60.834	-1.765	90.736	-1.199	89.275	-0.937				
21-SEP-93	12:01:23	13200	3.7	15.217	-38.473	103.09	-3.84	60.792	-1.807	90.761	-1.174	89.191	-1.021				
21-SEP-93	12:06:23	13500	3.8	15.208	-38.482	103.04	-3.89	60.724	-1.875	90.635	-1.3	89.123	-1.089				
21-SEP-93	12:11:23	13800	3.8	15.192	-38.498	103.05	-3.88	60.733	-1.866	90.626	-1.309	89.14	-1.072				
21-SEP-93	12:16:23	14100	3.9	15.023	-38.667	103.01	-3.92	60.707	-1.892	90.609	-1.326	89.115	-1.097				
21-SEP-93	12:21:23	14400	4.0	15.065	-38.625	102.97	-3.96	60.69	-1.909	90.592	-1.343	89.115	-1.097				
21-SEP-93	12:26:23	14700	4.1	15.073	-38.617	103	-3.93	60.69	-1.909	90.609	-1.326	89.123	-1.089				
21-SEP-93	12:31:23	15000	4.2	14.904	-38.786	102.94	-3.99	60.64	-1.959	90.584	-1.351	89.072	-1.14				
21-SEP-93	12:36:23	15300	4.3	14.938	-38.752	102.96	-3.97	60.64	-1.959	90.584	-1.351	89.115	-1.097				
21-SEP-93	12:41:23	15600	4.3	14.896	-38.794	102.92	-4.01	60.598	-2.001	90.55	-1.385	89.072	-1.14				
21-SEP-93	12:46:23	15900	4.4	14.803	-38.887	102.89	-4.04	60.606	-1.993	90.533	-1.402	89.03	-1.182				
21-SEP-93	12:51:23	16200	4.5	15.344	-38.346	102.93	-4	60.648	-1.951	90.609	-1.326	89.098	-1.114				
21-SEP-93	12:56:23	16500	4.6	15.293	-38.397	102.91	-4.02	60.598	-2.001	90.575	-1.36	89.064	-1.148				
21-SEP-93	13:01:23	16800	4.7	15.259	-38.431	102.9	-4.03	60.581	-2.018	90.55	-1.385	89.055	-1.157				
21-SEP-93	13:06:23	17100	4.8	15.234	-38.456	102.88	-4.05	60.564	-2.035	90.533	-1.402	89.022	-1.19				
21-SEP-93	13:11:23	17400	4.8	15.251	-38.439	102.9	-4.03	60.581	-2.018	90.559	-1.376	89.064	-1.148				
21-SEP-93	13:16:23	17700	4.9	15.251	-38.439	102.9	-4.03	60.589	-2.01	90.567	-1.368	89.03	-1.182				
21-SEP-93	13:21:23	18000	5.0	15.242	-38.448	102.83	-4.1	60.522	-2.077	90.491	-1.444	88.979	-1.233				
21-SEP-93	13:26:23	18300	5.1	15.175	-38.515	102.8	-4.13	60.513	-2.086	90.499	-1.436	88.988	-1.224				
21-SEP-93	13:31:23	18600	5.2	15.124	-38.566	102.77	-4.16	60.471	-2.128	90.457	-1.478	88.946	-1.266				
21-SEP-93	13:36:23	18900	5.3	15.192	-38.498	102.79	-4.14	60.471	-2.128	90.466	-1.469	88.946	-1.266				
21-SEP-93	13:41:23	19200	5.3	15.2	-38.49	102.79	-4.14	60.479	-2.12	90.457	-1.478	88.946	-1.266				
21-SEP-93	13:46:23	19500	5.4	15.2	-38.49	102.79	-4.14	60.471	-2.128	90.474	-1.461	88.971	-1.241				
21-SEP-93	13:51:23	19800	5.5	15.208	-38.482	102.76	-4.17	60.471	-2.128	90.457	-1.478	88.988	-1.224				
21-SEP-93	13:56:23	20100	5.6	15.132	-38.558	102.75	-4.18	60.437	-2.162	90.44	-1.495	88.929	-1.283				

Table E.2 82 and 66 GPM Water Level Drawdown Data

			PR-1		WT-17		WT-13		OW-1		OW-2	
			PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	Corrected	OW-2	Corrected
21-SEP-93,	08:21:23,	0	0.0	53.69	0	106.93	0	62.599	0	91.935	0	90.212
21-SEP-93	08:26:23	300	0.1	53.741	0.051	106.88	-0.05	62.523	-0.076	91.884	-0.051	90.145
21-SEP-93	08:31:23	600	0.2	20.064	-33.626	106	-0.93	62.379	-0.22	91.808	-0.127	90.086
21-SEP-93	08:36:23	900	0.3	19.068	-34.622	105.59	-1.34	62.303	-0.296	91.758	-0.177	90.069
21-SEP-93	08:41:23	1200	0.3	18.662	-35.028	105.28	-1.65	62.227	-0.372	91.732	-0.203	90.027
21-SEP-93	08:46:23	1500	0.4	18.443	-35.247	105.07	-1.86	62.185	-0.414	91.724	-0.211	90.018
21-SEP-93	08:51:23	1800	0.5	18.274	-35.416	104.9	-2.03	62.092	-0.507	91.648	-0.287	89.984
21-SEP-93	08:56:23	2100	0.6	18.173	-35.517	104.76	-2.17	62.058	-0.541	91.665	-0.27	90.001
21-SEP-93	09:01:23	2400	0.7	18.046	-35.644	104.64	-2.29	61.999	-0.6	91.623	-0.312	89.959
21-SEP-93	09:06:23	2700	0.8	17.911	-35.779	104.54	-2.39	61.949	-0.65	91.589	-0.346	90.027
21-SEP-93	09:11:23	3000	0.8	17.725	-35.965	104.42	-2.51	61.864	-0.735	91.521	-0.414	89.858
21-SEP-93	09:16:23	3300	0.9	17.683	-36.007	104.37	-2.56	61.83	-0.769	91.521	-0.414	89.883
21-SEP-93	09:21:23	3600	1.0	17.59	-36.1	104.27	-2.66	61.771	-0.828	91.471	-0.464	89.858
21-SEP-93	09:26:23	3900	1.1	17.565	-36.125	104.2	-2.73	61.738	-0.861	91.462	-0.473	89.832
21-SEP-93	09:31:23	4200	1.2	17.168	-36.522	104.11	-2.82	61.67	-0.929	91.395	-0.54	89.807
21-SEP-93	09:36:23	4500	1.3	17.092	-36.598	104.1	-2.83	61.67	-0.929	91.395	-0.54	89.782
21-SEP-93	09:41:23	4800	1.3	17.007	-36.683	104	-2.93	61.586	-1.013	91.352	-0.583	89.739
21-SEP-93	09:46:23	5100	1.4	16.821	-36.869	103.88	-3.05	61.484	-1.115	91.217	-0.718	89.621
21-SEP-93	09:51:23	5400	1.5	16.813	-36.877	103.93	-3	61.552	-1.047	91.344	-0.591	89.782
21-SEP-93	09:56:23	5700	1.6	17.117	-36.573	103.85	-3.08	61.467	-1.132	91.268	-0.667	89.655
21-SEP-93	10:01:23	6000	1.7	17.083	-36.607	103.81	-3.12	61.484	-1.115	91.251	-0.684	89.68
21-SEP-93	10:06:23	6300	1.8	17.058	-36.632	103.8	-3.13	61.442	-1.157	91.268	-0.667	89.672
21-SEP-93	10:11:23	6600	1.8	16.745	-36.945	103.71	-3.22	61.374	-1.225	91.175	-0.76	89.63
21-SEP-93	10:16:23	6900	1.9	16.644	-37.046	103.67	-3.26	61.315	-1.284	91.167	-0.768	89.596
21-SEP-93	10:21:23	7200	2.0	16.593	-37.097	103.61	-3.32	61.282	-1.317	91.15	-0.785	89.554
21-SEP-93	10:26:23	7500	2.1	16.585	-37.105	103.59	-3.34	61.231	-1.368	91.124	-0.811	89.562
21-SEP-93	10:31:23	7800	2.2	16.467	-37.223	103.52	-3.41	61.189	-1.41	91.082	-0.853	89.52
21-SEP-93	10:36:23	8100	2.3	16.492	-37.198	103.5	-3.43	61.163	-1.436	91.048	-0.887	89.495
21-SEP-93	10:41:23	8400	2.3	16.45	-37.24	103.45	-3.48	61.146	-1.453	91.023	-0.912	89.461
21-SEP-93	10:46:23	8700	2.4	16.391	-37.299	103.44	-3.49	61.104	-1.495	90.981	-0.954	89.427
21-SEP-93	10:51:23	9000	2.5	16.365	-37.325	103.35	-3.58	61.02	-1.579	90.905	-1.03	89.241
21-SEP-93	10:56:23	9300	2.6	16.365	-37.325	103.38	-3.55	61.062	-1.537	90.947	-0.988	89.393
21-SEP-93	11:01:23	9600	2.7	16.34	-37.35	103.36	-3.57	61.07	-1.529	90.972	-0.963	89.385
21-SEP-93	11:06:23	9900	2.8	15.766	-37.924	103.28	-3.65	60.935	-1.664	90.837	-1.098	89.292

Figure E.2 82&66 GPM Water Drawdowns
Product Recovery Pilot Study

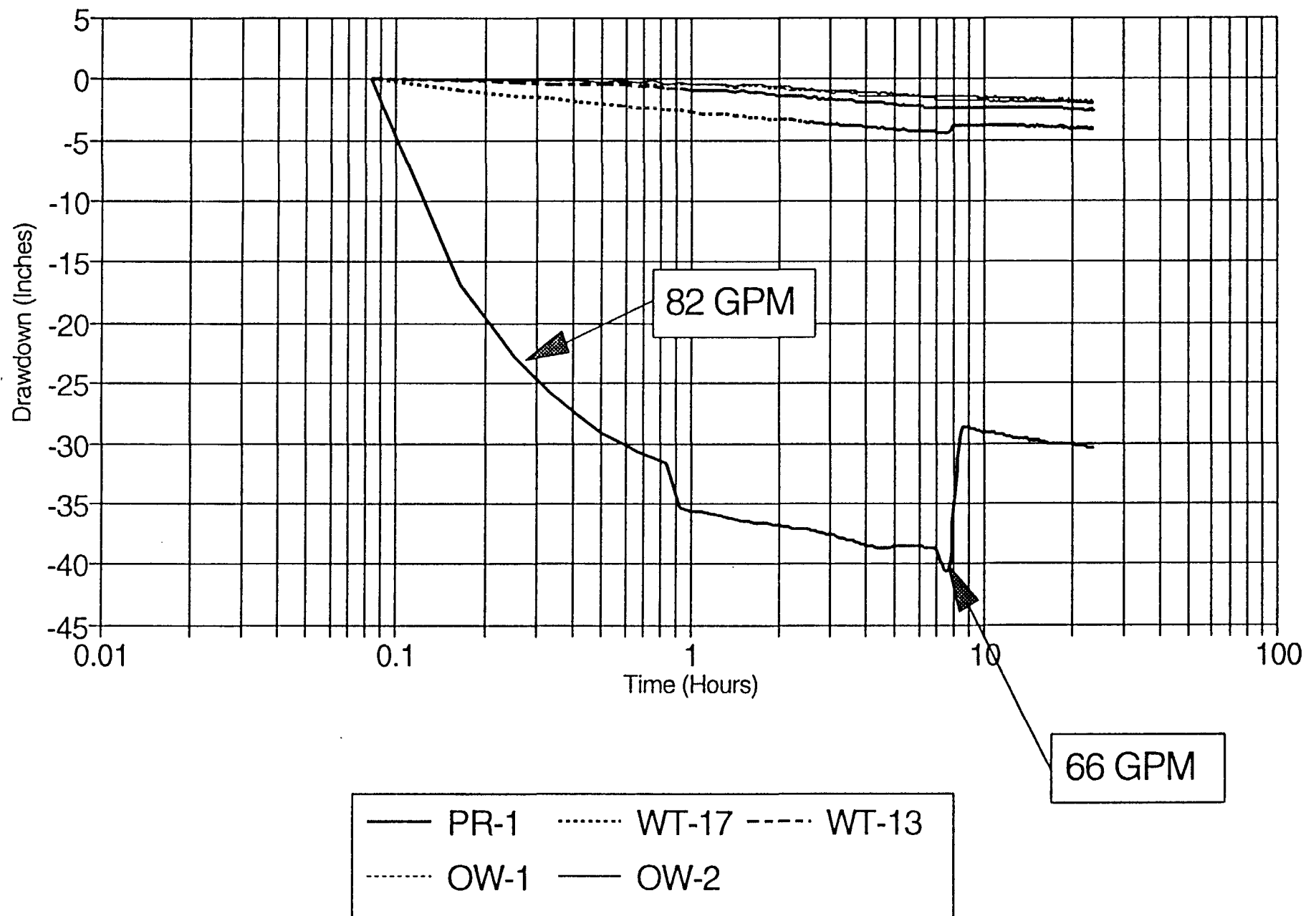


Table E.1 50 GPM Water Level Drawdown Data

	Time	Time (hrs)	PR-1	PR-1 Corrected	WT-17	WT-17 Corrected	WT-13	WT-13 Corrected	OW-1	OW-1 corrected	OW-2	OW-2 corrected
17-SEP-9 06:36:53,	81600	22.7	29.1	-23.999	103.94	-3	60.454	-2.001	90.246	-1.25	89.072	-1.579
17-SEP-9 06:41:53,	81900	22.8	29.015	-24.084	103.9	-3.04	60.412	-2.043	90.195	-1.301	89.03	-1.621
17-SEP-9 06:46:53,	82200	22.8	29.032	-24.067	103.89	-3.05	60.386	-2.069	90.187	-1.309	89.013	-1.638
17-SEP-9 06:51:53,	82500	22.9	29.057	-24.042	103.9	-3.04	60.412	-2.043	90.195	-1.301	89.03	-1.621
17-SEP-9 06:56:53,	82800	23.0	28.99	-24.109	103.92	-3.02	60.429	-2.026	90.212	-1.284	89.03	-1.621
17-SEP-9 07:01:53,	83100	23.1	29.007	-24.092	103.85	-3.09	60.344	-2.111	90.153	-1.343	88.971	-1.68
17-SEP-9 07:06:53,	83400	23.2	28.965	-24.134	103.88	-3.06	60.395	-2.06	90.179	-1.317	88.988	-1.663
17-SEP-9 07:11:53,	83700	23.3	28.99	-24.109	103.88	-3.06	60.395	-2.06	90.179	-1.317	88.988	-1.663
17-SEP-9 07:16:53,	84000	23.3	29.007	-24.092	103.88	-3.06	60.395	-2.06	90.195	-1.301	89.013	-1.638
17-SEP-9 07:21:53,	84300	23.4	28.905	-24.194	103.88	-3.06	60.395	-2.06	90.187	-1.309	89.013	-1.638
17-SEP-9 07:26:53,	84600	23.5	29.015	-24.084	103.89	-3.05	60.386	-2.069	90.195	-1.301	89.013	-1.638
17-SEP-9 07:31:53,	84900	23.6	28.973	-24.126	103.88	-3.06	60.395	-2.06	90.187	-1.309	89.013	-1.638
17-SEP-9 07:36:53,	85200	23.7	28.922	-24.177	103.88	-3.06	60.386	-2.069	90.179	-1.317	88.988	-1.663
17-SEP-9 07:41:53,	85500	23.8	29.032	-24.067	103.91	-3.03	60.42	-2.035	90.212	-1.284	89.039	-1.612
17-SEP-9 07:46:53,	85800	23.8	28.956	-24.143	103.93	-3.01	60.429	-2.026	90.238	-1.258	89.064	-1.587
17-SEP-9 07:51:53,	86100	23.9	28.956	-24.143	103.89	-3.05	60.386	-2.069	90.204	-1.292	89.022	-1.629
17-SEP-9 07:56:53,	86400	24.0	28.889	-24.21	103.82	-3.12	60.344		90.145	-1.351	88.954	-1.697
17-SEP-9 08:01:53,	86700	24.1	28.863	-24.236	103.84	-3.1	60.344		90.153	-1.343	88.971	-1.68

File Name PRPTST1.WQ1

Table E.1 50 GPM Water Level Drawdown Data

				PR-1		WT-17		WT-13		OW-1		OW-2	
	Time	Time (hrs)	PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	corrected	OW-2	corrected	
17-SEP-9	03:46:53,	71400	19.8	29.319	-23.78	104	-2.94	60.522	-1.933	90.28	-1.216	89.157	-1.494
17-SEP-9	03:51:53,	71700	19.9	29.277	-23.822	104	-2.94	60.513	-1.942	90.28	-1.216	89.275	-1.376
17-SEP-9	03:56:53,	72000	20.0	29.277	-23.822	103.97	-2.97	60.471	-1.984	90.229	-1.267	89.115	-1.536
17-SEP-9	04:01:53,	72300	20.1	29.319	-23.78	103.99	-2.95	60.496	-1.959	90.263	-1.233	89.14	-1.511
17-SEP-9	04:06:53,	72600	20.2	29.269	-23.83	103.96	-2.98	60.471	-1.984	90.229	-1.267	89.106	-1.545
17-SEP-9	04:11:53,	72900	20.3	29.226	-23.873	103.95	-2.99	60.471	-1.984	90.221	-1.275	89.14	-1.511
17-SEP-9	04:16:53,	73200	20.3	29.37	-23.729	103.99	-2.95	60.505	-1.95	90.255	-1.241	89.115	-1.536
17-SEP-9	04:21:53,	73500	20.4	29.26	-23.839	104.01	-2.93	60.513	-1.942	90.28	-1.216	89.165	-1.486
17-SEP-9	04:26:53,	73800	20.5	29.328	-23.771	104.06	-2.88	60.581	-1.874	90.364	-1.132	89.199	-1.452
17-SEP-9	04:31:53,	74100	20.6	29.277	-23.822	103.99	-2.95	60.496	-1.959	90.263	-1.233	89.14	-1.511
17-SEP-9	04:36:53,	74400	20.7	29.193	-23.906	103.98	-2.96	60.471	-1.984	90.263	-1.233	89.123	-1.528
17-SEP-9	04:41:53,	74700	20.8	29.277	-23.822	103.98	-2.96	60.479	-1.976	90.246	-1.25	89.115	-1.536
17-SEP-9	04:46:53,	75000	20.8	29.176	-23.923	103.92	-3.02	60.429	-2.026	90.195	-1.301	89.064	-1.587
17-SEP-9	04:51:53,	75300	20.9	29.201	-23.898	103.93	-3.01	60.429	-2.026	90.195	-1.301	89.081	-1.57
17-SEP-9	04:56:53,	75600	21.0	29.184	-23.915	103.91	-3.03	60.42	-2.035	90.187	-1.309	89.064	-1.587
17-SEP-9	05:01:53,	75900	21.1	29.142	-23.957	103.93	-3.01	60.429	-2.026	90.195	-1.301	89.072	-1.579
17-SEP-9	05:06:53,	76200	21.2	29.193	-23.906	103.93	-3.01	60.429	-2.026	90.212	-1.284	89.072	-1.579
17-SEP-9	05:11:53,	76500	21.3	29.117	-23.982	103.94	-3	60.454	-2.001	90.229	-1.267	89.072	-1.579
17-SEP-9	05:16:53,	76800	21.3	29.218	-23.881	103.93	-3.01	60.429	-2.026	90.221	-1.275	89.072	-1.579
17-SEP-9	05:21:53,	77100	21.4	29.142	-23.957	103.9	-3.04	60.412	-2.043	90.195	-1.301	89.03	-1.621
17-SEP-9	05:26:53,	77400	21.5	29.133	-23.966	103.9	-3.04	60.412	-2.043	90.187	-1.309	89.03	-1.621
17-SEP-9	05:31:53,	77700	21.6	29.176	-23.923	103.94	-3	60.454	-2.001	90.229	-1.267	89.081	-1.57
17-SEP-9	05:36:53,	78000	21.7	29.176	-23.923	103.98	-2.96	60.471	-1.984	90.263	-1.233	89.115	-1.536
17-SEP-9	05:41:53,	78300	21.8	29.159	-23.94	103.93	-3.01	60.429	-2.026	90.204	-1.292	89.072	-1.579
17-SEP-9	05:46:53,	78600	21.8	29.142	-23.957	103.92	-3.02	60.42	-2.035	90.187	-1.309	89.03	-1.621
17-SEP-9	05:51:53,	78900	21.9	29.074	-24.025	103.89	-3.05	60.386	-2.069	90.17	-1.326	89.022	-1.629
17-SEP-9	05:56:53,	79200	22.0	29.142	-23.957	103.91	-3.03	60.42	-2.035	90.187	-1.309	89.039	-1.612
17-SEP-9	06:01:53,	79500	22.1	29.083	-24.016	103.91	-3.03	60.42	-2.035	90.17	-1.326	89.03	-1.621
17-SEP-9	06:06:53,	79800	22.2	29.133	-23.966	103.93	-3.01	60.437	-2.018	90.187	-1.309	89.055	-1.596
17-SEP-9	06:11:53,	80100	22.3	29.049	-24.05	103.93	-3.01	60.429	-2.026	90.195	-1.301	89.055	-1.596
17-SEP-9	06:16:53,	80400	22.3	29.091	-24.008	103.9	-3.04	60.386	-2.069	90.187	-1.309	89.03	-1.621
17-SEP-9	06:21:53,	80700	22.4	29.015	-24.084	103.92	-3.02	60.429	-2.026	90.212	-1.284	89.148	-1.503
17-SEP-9	06:26:53,	81000	22.5	29.117	-23.982	103.95	-2.99	60.471	-1.984	90.255	-1.241	89.081	-1.57
17-SEP-9	06:31:53,	81300	22.6	29.083	-24.016	103.97	-2.97	60.471	-1.984	90.271	-1.225	89.106	-1.545

Table E.1 50 GPM Water Level Drawdown Data

	Time	Time (hrs)	PR-1	PR-1 Corrected	WT-17	WT-17 Corrected	WT-13	WT-13 Corrected	OW-1	OW-1 corrected	OW-2	OW-2 corrected
17-SEP-9 00:56:53,	61200	17.0	29.64	-23.459	104.03	-2.91	60.598	-1.857	90.331	-1.165	89.241	-1.41
17-SEP-9 01:01:53,	61500	17.1	29.657	-23.442	104.08	-2.86	60.64	-1.815	90.364	-1.132	89.275	-1.376
17-SEP-9 01:06:53,	61800	17.2	29.598	-23.501	104.05	-2.89	60.606	-1.849	90.331	-1.165	89.241	-1.41
17-SEP-9 01:11:53,	62100	17.3	29.556	-23.543	104.05	-2.89	60.606	-1.849	90.339	-1.157	89.241	-1.41
17-SEP-9 01:16:53,	62400	17.3	29.564	-23.535	104.03	-2.91	60.581	-1.874	90.322	-1.174	89.207	-1.444
17-SEP-9 01:21:53,	62700	17.4	29.556	-23.543	104.02	-2.92	60.555	-1.9	90.305	-1.191	89.207	-1.444
17-SEP-9 01:26:53,	63000	17.5	29.556	-23.543	104.01	-2.93	60.564	-1.891	90.314	-1.182	89.191	-1.46
17-SEP-9 01:31:53,	63300	17.6	29.556	-23.543	103.99	-2.95	60.538	-1.917	90.263	-1.233	89.157	-1.494
17-SEP-9 01:36:53,	63600	17.7	29.649	-23.45	104.08	-2.86	60.623	-1.832	90.347	-1.149	89.25	-1.401
17-SEP-9 01:41:53,	63900	17.8	29.682	-23.417	104.15	-2.79	60.69	-1.765	90.466	-1.03	89.334	-1.317
17-SEP-9 01:46:53,	64200	17.8	29.556	-23.543	104.03	-2.91	60.564	-1.891	90.305	-1.191	89.191	-1.46
17-SEP-9 01:51:53,	64500	17.9	29.513	-23.586	104.02	-2.92	60.564	-1.891	90.297	-1.199	89.191	-1.46
17-SEP-9 01:56:53,	64800	18.0	29.471	-23.628	103.98	-2.96	60.522	-1.933	90.263	-1.233	89.157	-1.494
17-SEP-9 02:01:53,	65100	18.1	29.446	-23.653	104.01	-2.93	60.555	-1.9	90.288	-1.208	89.191	-1.46
17-SEP-9 02:06:53,	65400	18.2	29.437	-23.662	104.01	-2.93	60.555	-1.9	90.297	-1.199	89.191	-1.46
17-SEP-9 02:11:53,	65700	18.3	29.522	-23.577	104.04	-2.9	60.555	-1.9	90.314	-1.182	89.241	-1.41
17-SEP-9 02:16:53,	66000	18.3	29.581	-23.518	104.04	-2.9	60.581	-1.874	90.314	-1.182	89.199	-1.452
17-SEP-9 02:21:53,	66300	18.4	29.53	-23.569	104.05	-2.89	60.589	-1.866	90.322	-1.174	89.199	-1.452
17-SEP-9 02:26:53,	66600	18.5	29.488	-23.611	104.02	-2.92	60.564	-1.891	90.271	-1.225	89.393	-1.258
17-SEP-9 02:31:53,	66900	18.6	29.446	-23.653	103.99	-2.95	60.538	-1.917	90.271	-1.225	89.165	-1.486
17-SEP-9 02:36:53,	67200	18.7	29.429	-23.67	104.02	-2.92	60.555	-1.9	90.305	-1.191	89.233	-1.418
17-SEP-9 02:41:53,	67500	18.8	29.429	-23.67	104.04	-2.9	60.555	-1.9	90.322	-1.174	89.207	-1.444
17-SEP-9 02:46:53,	67800	18.8	29.429	-23.67	104.02	-2.92	60.555	-1.9	90.305	-1.191	89.182	-1.469
17-SEP-9 02:51:53,	68100	18.9	29.471	-23.628	104.04	-2.9	60.564	-1.891	90.314	-1.182	89.199	-1.452
17-SEP-9 02:56:53,	68400	19.0	29.437	-23.662	104.01	-2.93	60.547	-1.908	90.28	-1.216	89.157	-1.494
17-SEP-9 03:01:53,	68700	19.1	29.437	-23.662	104.02	-2.92	60.547	-1.908	90.297	-1.199	89.182	-1.469
17-SEP-9 03:06:53,	69000	19.2	29.387	-23.712	104.03	-2.91	60.547	-1.908	90.415	-1.081	89.191	-1.46
17-SEP-9 03:11:53,	69300	19.3	29.353	-23.746	104.04	-2.9	60.555	-1.9	90.322	-1.174	89.207	-1.444
17-SEP-9 03:16:53,	69600	19.3	29.387	-23.712	104.04	-2.9	60.564	-1.891	90.305	-1.191	89.199	-1.452
17-SEP-9 03:21:53,	69900	19.4	29.387	-23.712	104.02	-2.92	60.538	-1.917	90.288	-1.208	89.157	-1.494
17-SEP-9 03:26:53,	70200	19.5	29.37	-23.729	104	-2.94	60.538	-1.917	90.271	-1.225	89.165	-1.486
17-SEP-9 03:31:53,	70500	19.6	29.311	-23.788	104.03	-2.91	60.547	-1.908	90.288	-1.208	89.157	-1.494
17-SEP-9 03:36:53,	70800	19.7	29.353	-23.746	104	-2.94	60.513	-1.942	90.271	-1.225	89.148	-1.503
17-SEP-9 03:41:53,	71100	19.8	29.387	-23.712	103.97	-2.97	60.496	-1.959	90.255	-1.241	89.115	-1.536

Table E.1 50 GPM Water Level Drawdown Data

		Time	Time (hrs)	PR-1	PR-1	WT-17	WT-17	WT-13	WT-13	OW-1	OW-1	OW-2	OW-2
					Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	corrected	OW-2	corrected
16-SEP-9	22:06:53,	51000	14.2	29.961	-23.138	104.08	-2.86	60.682	-1.773	90.381	-1.115	89.283	-1.368
16-SEP-9	22:11:53,	51300	14.3	29.936	-23.163	104.04	-2.9	60.64	-1.815	90.347	-1.149	89.309	-1.342
16-SEP-9	22:16:53,	51600	14.3	29.919	-23.18	104.07	-2.87	60.674	-1.781	90.364	-1.132	89.292	-1.359
16-SEP-9	22:21:53,	51900	14.4	29.902	-23.197	104.08	-2.86	60.682	-1.773	90.373	-1.123	89.283	-1.368
16-SEP-9	22:26:53,	52200	14.5	29.969	-23.13	104.1	-2.84	60.682	-1.773	90.398	-1.098	89.326	-1.325
16-SEP-9	22:31:53,	52500	14.6	29.91	-23.189	104.1	-2.84	60.682	-1.773	90.407	-1.089	89.326	-1.325
16-SEP-9	22:36:53,	52800	14.7	29.902	-23.197	104.09	-2.85	60.682	-1.773	90.381	-1.115	89.283	-1.368
16-SEP-9	22:41:53,	53100	14.8	29.927	-23.172	104.2	-2.74	60.792	-1.663	90.474	-1.022	89.41	-1.241
16-SEP-9	22:46:53,	53400	14.8	29.817	-23.282	104.07	-2.87	60.64	-1.815	90.356	-1.14	89.283	-1.368
16-SEP-9	22:51:53,	53700	14.9	29.809	-23.29	104.09	-2.85	60.665	-1.79	90.373	-1.123	89.283	-1.368
16-SEP-9	22:56:53,	54000	15.0	29.885	-23.214	104.09	-2.85	60.674	-1.781	90.381	-1.115	89.309	-1.342
16-SEP-9	23:01:53,	54300	15.1	29.944	-23.155	104.16	-2.78	60.758	-1.697	90.449	-1.047	89.376	-1.275
16-SEP-9	23:06:53,	54600	15.2	29.733	-23.366	104.02	-2.92	60.623	-1.832	90.314	-1.182	89.241	-1.41
16-SEP-9	23:11:53,	54900	15.3	29.741	-23.358	104.02	-2.92	60.606	-1.849	90.297	-1.199	89.283	-1.368
16-SEP-9	23:16:53,	55200	15.3	29.767	-23.332	104.02	-2.92	60.606	-1.849	90.314	-1.182	89.233	-1.418
16-SEP-9	23:21:53,	55500	15.4	29.792	-23.307	104.03	-2.91	60.623	-1.832	90.322	-1.174	89.241	-1.41
16-SEP-9	23:26:53,	55800	15.5	29.817	-23.282	104.05	-2.89	60.64	-1.815	90.347	-1.149	89.241	-1.41
16-SEP-9	23:31:53,	56100	15.6	29.784	-23.315	104.05	-2.89	60.665	-1.79	90.347	-1.149	89.25	-1.401
16-SEP-9	23:36:53,	56400	15.7	29.784	-23.315	104.06	-2.88	60.648	-1.807	90.356	-1.14	89.241	-1.41
16-SEP-9	23:41:53,	56700	15.8	29.809	-23.29	104.1	-2.84	60.682	-1.773	90.381	-1.115	89.292	-1.359
16-SEP-9	23:46:53,	57000	15.8	29.767	-23.332	104.08	-2.86	60.64	-1.815	90.364	-1.132	89.275	-1.376
16-SEP-9	23:51:53,	57300	15.9	29.86	-23.239	104.1	-2.84	60.682	-1.773	90.398	-1.098	89.283	-1.368
16-SEP-9	23:56:53,	57600	16.0	29.767	-23.332	104.06	-2.88	60.665	-1.79	90.347	-1.149	89.241	-1.41
17-SEP-9	00:01:53,	57900	16.1	29.792	-23.307	104.11	-2.83	60.682	-1.773	90.415	-1.081	89.3	-1.351
17-SEP-9	00:06:53,	58200	16.2	29.733	-23.366	104.1	-2.84	60.682	-1.773	90.381	-1.115	89.309	-1.342
17-SEP-9	00:11:53,	58500	16.3	29.691	-23.408	104.05	-2.89	60.623	-1.832	90.331	-1.165	89.334	-1.317
17-SEP-9	00:16:53,	58800	16.3	29.682	-23.417	104.08	-2.86	60.64	-1.815	90.331	-1.165	89.275	-1.376
17-SEP-9	00:21:53,	59100	16.4	29.682	-23.417	104.07	-2.87	60.64	-1.815	90.356	-1.14	89.241	-1.41
17-SEP-9	00:26:53,	59400	16.5	29.598	-23.501	104.01	-2.93	60.581	-1.874	90.297	-1.199	89.199	-1.452
17-SEP-9	00:31:53,	59700	16.6	29.649	-23.45	104.03	-2.91	60.598	-1.857	90.314	-1.182	89.292	-1.359
17-SEP-9	00:36:53,	60000	16.7	29.64	-23.459	104	-2.94	60.581	-1.874	90.305	-1.191	89.207	-1.444
17-SEP-9	00:41:53,	60300	16.8	29.682	-23.417	104.04	-2.9	60.598	-1.857	90.339	-1.157	89.3	-1.351
17-SEP-9	00:46:53,	60600	16.8	29.725	-23.374	104.06	-2.88	60.623	-1.832	90.347	-1.149	89.25	-1.401
17-SEP-9	00:51:53,	60900	16.9	29.64	-23.459	104.04	-2.9	60.598	-1.857	90.331	-1.165	89.241	-1.41

Table E.1 50 GPM Water Level Drawdown Data

				PR-1		WT-17		WT-13		OW-1		OW-2
		Time	Time (hrs)	PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	corrected	OW-2
16-SEP-9	19:16:53,	40800	11.3	30.409	-22.69	104.37	-2.57	60.978	-1.477	90.635	-0.861	89.596
16-SEP-9	19:21:53,	41100	11.4	30.358	-22.741	104.24	-2.7	60.876	-1.579	90.516	-0.98	89.469
16-SEP-9	19:26:53,	41400	11.5	30.223	-22.876	104.19	-2.75	60.817	-1.638	90.449	-1.047	89.435
16-SEP-9	19:31:53,	41700	11.6	30.307	-22.792	104.21	-2.73	60.842	-1.613	90.474	-1.022	89.452
16-SEP-9	19:36:53,	42000	11.7	30.257	-22.842	104.17	-2.77	60.8	-1.655	90.449	-1.047	89.41
16-SEP-9	19:41:53,	42300	11.8	30.257	-22.842	104.18	-2.76	60.809	-1.646	90.457	-1.039	89.419
16-SEP-9	19:46:53,	42600	11.8	30.189	-22.91	104.13	-2.81	60.758	-1.697	90.407	-1.089	89.376
16-SEP-9	19:51:53,	42900	11.9	30.358	-22.741	104.3	-2.64	60.918	-1.537	90.575	-0.921	89.511
16-SEP-9	19:56:53,	43200	12.0	30.265	-22.834	104.2	-2.74	60.809	-1.646	90.474	-1.022	89.427
16-SEP-9	20:01:53,	43500	12.1	30.214	-22.885	104.16	-2.78	60.766	-1.689	90.432	-1.064	89.393
16-SEP-9	20:06:53,	43800	12.2	30.206	-22.893	104.18	-2.76	60.792	-1.663	90.449	-1.047	89.41
16-SEP-9	20:11:53,	44100	12.3	30.181	-22.918	104.17	-2.77	60.792	-1.663	90.449	-1.047	89.503
16-SEP-9	20:16:53,	44400	12.3	30.121	-22.978	104.14	-2.8	60.758	-1.697	90.407	-1.089	89.368
16-SEP-9	20:21:53,	44700	12.4	30.088	-23.011	104.11	-2.83	60.733	-1.722	90.39	-1.106	89.351
16-SEP-9	20:26:53,	45000	12.5	30.113	-22.986	104.15	-2.79	60.758	-1.697	90.423	-1.073	89.368
16-SEP-9	20:31:53,	45300	12.6	30.088	-23.011	104.17	-2.77	60.766	-1.689	90.44	-1.056	89.41
16-SEP-9	20:36:53,	45600	12.7	30.062	-23.037	104.15	-2.79	60.724	-1.731	90.415	-1.081	89.469
16-SEP-9	20:41:53,	45900	12.8	30.045	-23.054	104.12	-2.82	60.733	-1.722	90.39	-1.106	89.343
16-SEP-9	20:46:53,	46200	12.8	30.121	-22.978	104.15	-2.79	60.758	-1.697	90.415	-1.081	89.368
16-SEP-9	20:51:53,	46500	12.9	29.986	-23.113	104.08	-2.86	60.682	-1.773	90.339	-1.157	89.309
16-SEP-9	20:56:53,	46800	13.0	29.995	-23.104	104.11	-2.83	60.716	-1.739	90.381	-1.115	89.326
16-SEP-9	21:01:53,	47100	13.1	30.003	-23.096	104.12	-2.82	60.724	-1.731	90.398	-1.098	89.351
16-SEP-9	21:06:53,	47400	13.2	29.995	-23.104	104.07	-2.87	60.674	-1.781	90.347	-1.149	89.283
16-SEP-9	21:11:53,	47700	13.3	30.003	-23.096	104.1	-2.84	60.707	-1.748	90.39	-1.106	89.326
16-SEP-9	21:16:53,	48000	13.3	30.02	-23.079	104.1	-2.84	60.716	-1.739	90.39	-1.106	89.41
16-SEP-9	21:21:53,	48300	13.4	30.121	-22.978	104.2	-2.74	60.809	-1.646	90.483	-1.013	89.41
16-SEP-9	21:26:53,	48600	13.5	30.003	-23.096	104.1	-2.84	60.707	-1.748	90.381	-1.115	89.3
16-SEP-9	21:31:53,	48900	13.6	30.045	-23.054	104.1	-2.84	60.682	-1.773	90.381	-1.115	89.309
16-SEP-9	21:36:53,	49200	13.7	29.986	-23.113	104.1	-2.84	60.682	-1.773	90.381	-1.115	89.309
16-SEP-9	21:41:53,	49500	13.8	29.995	-23.104	104.12	-2.82	60.724	-1.731	90.398	-1.098	89.326
16-SEP-9	21:46:53,	49800	13.8	29.995	-23.104	104.08	-2.86	60.682	-1.773	90.356	-1.14	89.283
16-SEP-9	21:51:53,	50100	13.9	29.995	-23.104	104.14	-2.8	60.724	-1.731	90.423	-1.073	89.343
16-SEP-9	21:56:53,	50400	14.0	29.978	-23.121	104.08	-2.86	60.674	-1.781	90.373	-1.123	89.351
16-SEP-9	22:01:53,	50700	14.1	29.919	-23.18	104.07	-2.87	60.674	-1.781	90.364	-1.132	89.292

Table E.1 50 GPM Water Level Drawdown Data

			PR-1			WT-17		WT-13		OW-1		OW-2	
	Time	Time (hrs)	PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	corrected	OW-2	corrected	
16-SEP-9	16:26:53,	30600	8.5	30.881	-22.218	104.34	-2.6	61.02	-1.435	90.601	-0.895	89.621	-1.03
16-SEP-9	16:31:53,	30900	8.6	30.822	-22.277	104.38	-2.56	61.062	-1.393	90.651	-0.845	89.68	-0.971
16-SEP-9	16:36:53,	31200	8.7	30.738	-22.361	104.3	-2.64	60.978	-1.477	90.575	-0.921	89.579	-1.072
16-SEP-9	16:41:53,	31500	8.8	30.822	-22.277	104.35	-2.59	61.045	-1.41	90.618	-0.878	89.604	-1.047
16-SEP-9	16:46:53,	31800	8.8	30.848	-22.251	104.35	-2.59	61.045	-1.41	90.609	-0.887	89.647	-1.004
16-SEP-9	16:51:53,	32100	8.9	30.67	-22.429	104.27	-2.67	60.969	-1.486	90.542	-0.954	89.537	-1.114
16-SEP-9	16:56:53,	32400	9.0	30.704	-22.395	104.31	-2.63	60.978	-1.477	90.584	-0.912	89.604	-1.047
16-SEP-9	17:01:53,	32700	9.1	30.721	-22.378	104.25	-2.69	60.927	-1.528	90.516	-0.98	89.511	-1.14
16-SEP-9	17:06:53,	33000	9.2	30.772	-22.327	104.3	-2.64	60.969	-1.486	90.55	-0.946	89.579	-1.072
16-SEP-9	17:11:53,	33300	9.3	30.687	-22.412	104.31	-2.63	60.978	-1.477	90.559	-0.937	89.554	-1.097
16-SEP-9	17:16:53,	33600	9.3	30.679	-22.42	104.3	-2.64	60.969	-1.486	90.55	-0.946	89.579	-1.072
16-SEP-9	17:21:53,	33900	9.4	30.586	-22.513	104.29	-2.65	60.978	-1.477	90.803	-0.693	89.587	-1.064
16-SEP-9	17:26:53,	34200	9.5	30.653	-22.446	104.27	-2.67	60.935	-1.52	90.542	-0.954	89.545	-1.106
16-SEP-9	17:31:53,	34500	9.6	30.611	-22.488	104.23	-2.71	60.902	-1.553	90.508	-0.988	89.52	-1.131
16-SEP-9	17:36:53,	34800	9.7	30.628	-22.471	104.27	-2.67	60.935	-1.52	90.542	-0.954	89.537	-1.114
16-SEP-9	17:41:53,	35100	9.8	30.561	-22.538	104.28	-2.66	60.935	-1.52	90.542	-0.954	89.562	-1.089
16-SEP-9	17:46:53,	35400	9.8	30.603	-22.496	104.31	-2.63	60.978	-1.477	90.584	-0.912	89.579	-1.072
16-SEP-9	17:51:53,	35700	9.9	30.594	-22.505	104.32	-2.62	60.986	-1.469	90.559	-0.937	89.587	-1.064
16-SEP-9	17:56:53,	36000	10.0	30.569	-22.53	104.29	-2.65	60.961	-1.494	90.567	-0.929	89.554	-1.097
16-SEP-9	18:01:53,	36300	10.1	30.561	-22.538	104.26	-2.68	60.918	-1.537	90.525	-0.971	89.511	-1.14
16-SEP-9	18:06:53,	36600	10.2	30.51	-22.589	104.21	-2.73	60.851	-1.604	90.483	-1.013	89.469	-1.182
16-SEP-9	18:11:53,	36900	10.3	30.527	-22.572	104.25	-2.69	60.893	-1.562	90.508	-0.988	89.52	-1.131
16-SEP-9	18:16:53,	37200	10.3	30.569	-22.53	104.28	-2.66	60.935	-1.52	90.559	-0.937	89.562	-1.089
16-SEP-9	18:21:53,	37500	10.4	30.51	-22.589	104.2	-2.74	60.851	-1.604	90.483	-1.013	89.469	-1.182
16-SEP-9	18:26:53,	37800	10.5	30.442	-22.657	104.17	-2.77	60.834	-1.621	90.449	-1.047	89.435	-1.216
16-SEP-9	18:31:53,	38100	10.6	30.451	-22.648	104.21	-2.73	60.851	-1.604	90.491	-1.005	89.469	-1.182
16-SEP-9	18:36:53,	38400	10.7	30.442	-22.657	104.2	-2.74	60.851	-1.604	90.466	-1.03	89.461	-1.19
16-SEP-9	18:41:53,	38700	10.8	30.349	-22.75	104.18	-2.76	60.834	-1.621	90.466	-1.03	89.452	-1.199
16-SEP-9	18:46:53,	39000	10.8	30.341	-22.758	104.17	-2.77	60.817	-1.638	90.44	-1.056	89.41	-1.241
16-SEP-9	18:51:53,	39300	10.9	30.316	-22.783	104.14	-2.8	60.766	-1.689	90.423	-1.073	89.393	-1.258
16-SEP-9	18:56:53,	39600	11.0	30.333	-22.766	104.16	-2.78	60.8	-1.655	90.432	-1.064	89.41	-1.241
16-SEP-9	19:01:53,	39900	11.1	30.273	-22.826	104.16	-2.78	60.8	-1.655	90.432	-1.064	89.41	-1.241
16-SEP-9	19:06:53,	40200	11.2	30.265	-22.834	104.18	-2.76	60.817	-1.638	90.457	-1.039	89.427	-1.224
16-SEP-9	19:11:53,	40500	11.3	30.299	-22.8	104.16	-2.78	60.809	-1.646	90.449	-1.047	89.41	-1.241

Table E.1 50 GPM Water Level Drawdown Data

			PR-1		WT-17		WT-13		OW-1		OW-2		
	Time	Time (hrs)	PR-1	Corrected	WT-17	Corrected	WT-13	Corrected	OW-1	corrected	OW-2	corrected	
16-SEP-9	13:36:53,	20400	5.7	31.413	-21.686	104.48	-2.46	61.214	-1.241	90.744	-0.752	89.815	-0.836
16-SEP-9	13:41:53,	20700	5.8	31.363	-21.736	104.5	-2.44	61.206	-1.249	90.744	-0.752	89.815	-0.836
16-SEP-9	13:46:53,	21000	5.8	31.371	-21.728	104.53	-2.41	61.273	-1.182	90.778	-0.718	89.858	-0.793
16-SEP-9	13:51:53,	21300	5.9	31.329	-21.77	104.48	-2.46	61.189	-1.266	90.719	-0.777	89.849	-0.802
16-SEP-9	13:56:53,	21600	6.0	31.278	-21.821	104.46	-2.48	61.189	-1.266	90.702	-0.794	89.773	-0.878
16-SEP-9	14:01:53,	21900	6.1	31.363	-21.736	104.48	-2.46	61.206	-1.249	90.727	-0.769	89.79	-0.861
16-SEP-9	14:06:53,	22200	6.2	31.329	-21.77	104.5	-2.44	61.239	-1.216	90.744	-0.752	89.815	-0.836
16-SEP-9	14:11:53,	22500	6.3	31.287	-21.812	104.52	-2.42	61.273	-1.182	90.795	-0.701	89.934	-0.717
16-SEP-9	14:16:53,	22800	6.3	31.236	-21.863	104.46	-2.48	61.197	-1.258	90.719	-0.777	89.782	-0.869
16-SEP-9	14:21:53,	23100	6.4	31.27	-21.829	104.47	-2.47	61.197	-1.258	90.711	-0.785	89.799	-0.852
16-SEP-9	14:26:53,	23400	6.5	31.109	-21.99	104.43	-2.51	61.172	-1.283	90.677	-0.819	89.748	-0.903
16-SEP-9	14:31:53,	23700	6.6	31.126	-21.973	104.44	-2.5	61.172	-1.283	90.694	-0.802	89.756	-0.895
16-SEP-9	14:36:53,	24000	6.7	31.245	-21.854	104.49	-2.45	61.206	-1.249	90.753	-0.743	89.79	-0.861
16-SEP-9	14:41:53,	24300	6.8	31.084	-22.015	104.44	-2.5	61.189	-1.266	90.711	-0.785	89.79	-0.861
16-SEP-9	14:46:53,	24600	6.8	31.067	-22.032	104.39	-2.55	61.104	-1.351	90.643	-0.853	89.731	-0.92
16-SEP-9	14:51:53,	24900	6.9	31.109	-21.99	104.46	-2.48	61.197	-1.258	90.719	-0.777	89.765	-0.886
16-SEP-9	14:56:53,	25200	7.0	31	-22.099	104.41	-2.53	61.113	-1.342	90.643	-0.853	89.714	-0.937
16-SEP-9	15:01:53,	25500	7.1	31.101	-21.998	104.44	-2.5	61.146	-1.309	90.685	-0.811	89.739	-0.912
16-SEP-9	15:06:53,	25800	7.2	30.957	-22.142	104.43	-2.51	61.146	-1.309	90.694	-0.802	89.739	-0.912
16-SEP-9	15:11:53,	26100	7.3	30.941	-22.158	104.35	-2.59	61.062	-1.393	90.609	-0.887	89.647	-1.004
16-SEP-9	15:16:53,	26400	7.3	30.907	-22.192	104.33	-2.61	61.037	-1.418	90.584	-0.912	89.663	-0.988
16-SEP-9	15:21:53,	26700	7.4	30.915	-22.184	104.35	-2.59	61.062	-1.393	90.626	-0.87	89.655	-0.996
16-SEP-9	15:26:53,	27000	7.5	30.974	-22.125	104.38	-2.56	61.104	-1.351	90.651	-0.845	89.68	-0.971
16-SEP-9	15:31:53,	27300	7.6	30.924	-22.175	104.39	-2.55	61.104	-1.351	90.66	-0.836	89.689	-0.962
16-SEP-9	15:36:53,	27600	7.7	30.941	-22.158	104.35	-2.59	61.062	-1.393	90.601	-0.895	89.63	-1.021
16-SEP-9	15:41:53,	27900	7.8	31.076	-22.023	104.4	-2.54	61.121	-1.334	90.685	-0.811	89.697	-0.954
16-SEP-9	15:46:53,	28200	7.8	30.941	-22.158	104.38	-2.56	61.104	-1.351	90.651	-0.845	89.672	-0.979
16-SEP-9	15:51:53,	28500	7.9	30.983	-22.116	104.48	-2.46	61.197	-1.258	90.736	-0.76	89.773	-0.878
16-SEP-9	15:56:53,	28800	8.0	31.025	-22.074	104.45	-2.49	61.172	-1.283	90.711	-0.785	89.79	-0.861
16-SEP-9	16:01:53,	29100	8.1	30.831	-22.268	104.31	-2.63	61.02	-1.435	90.584	-0.912	89.596	-1.055
16-SEP-9	16:06:53,	29400	8.2	30.89	-22.209	104.34	-2.6	61.037	-1.418	90.609	-0.887	89.655	-0.996
16-SEP-9	16:11:53,	29700	8.3	30.881	-22.218	104.34	-2.6	61.045	-1.41	90.601	-0.895	89.638	-1.013
16-SEP-9	16:16:53,	30000	8.3	30.848	-22.251	104.35	-2.59	61.062	-1.393	90.626	-0.87	89.663	-0.988
16-SEP-9	16:21:53,	30300	8.4	30.789	-22.31	104.27	-2.67	60.969	-1.486	90.542	-0.954	89.579	-1.072

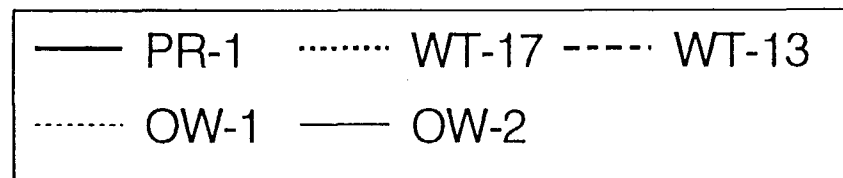
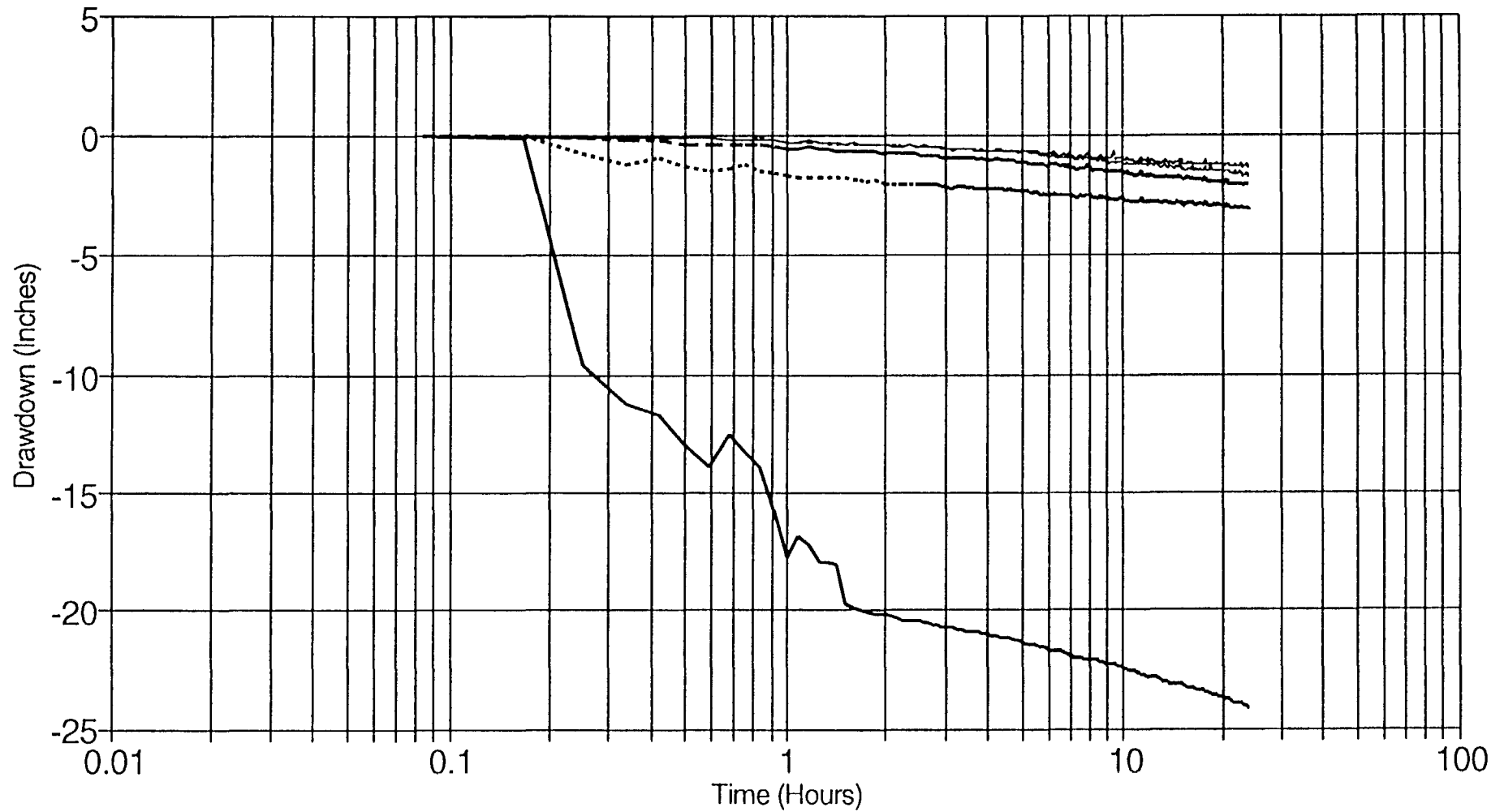
Table E.1 50 GPM Water Level Drawdown Data

		Time	Time (hrs)	PR-1	PR-1 Corrected	WT-17	WT-17 Corrected	WT-13	WT-13 Corrected	OW-1	OW-1 corrected	OW-2	OW-2 corrected
16-SEP-9	10:46:53,	10200	2.8	32.3	-20.799	104.86	-2.08	61.611	-0.844	91.006	-0.49	90.162	-0.489
16-SEP-9	10:51:53,	10500	2.9	32.258	-20.841	104.83	-2.11	61.594	-0.861	90.998	-0.498	90.119	-0.532
16-SEP-9	10:56:53,	10800	3.0	32.157	-20.942	104.8	-2.14	61.552	-0.903	90.947	-0.549	90.086	-0.565
16-SEP-9	11:01:53,	11100	3.1	32.106	-20.993	104.78	-2.16	61.543	-0.912	90.955	-0.541	90.086	-0.565
16-SEP-9	11:06:53,	11400	3.2	32.19	-20.909	104.77	-2.17	61.535	-0.92	90.939	-0.557	90.069	-0.582
16-SEP-9	11:11:53,	11700	3.3	32.123	-20.976	104.79	-2.15	61.569	-0.886	90.981	-0.515	90.136	-0.515
16-SEP-9	11:16:53,	12000	3.3	32.173	-20.926	104.8	-2.14	61.569	-0.886	90.981	-0.515	90.103	-0.548
16-SEP-9	11:21:53,	12300	3.4	32.131	-20.968	104.79	-2.15	61.56	-0.895	90.972	-0.524	90.086	-0.565
16-SEP-9	11:26:53,	12600	3.5	32.131	-20.968	104.78	-2.16	61.552	-0.903	90.964	-0.532	90.111	-0.54
16-SEP-9	11:31:53,	12900	3.6	32.047	-21.052	104.79	-2.15	61.569	-0.886	90.981	-0.515	90.128	-0.523
16-SEP-9	11:36:53,	13200	3.7	32.038	-21.061	104.75	-2.19	61.51	-0.945	90.93	-0.566	90.069	-0.582
16-SEP-9	11:41:53,	13500	3.8	31.996	-21.103	104.72	-2.22	61.442	-1.013	90.879	-0.617	90.018	-0.633
16-SEP-9	11:46:53,	13800	3.8	31.954	-21.145	104.73	-2.21	61.493	-0.962	90.93	-0.566	90.069	-0.582
16-SEP-9	11:51:53,	14100	3.9	31.903	-21.196	104.7	-2.24	61.442	-1.013	90.905	-0.591	90.027	-0.624
16-SEP-9	11:56:53,	14400	4.0	31.895	-21.204	104.7	-2.24	61.45	-1.005	90.888	-0.608	90.018	-0.633
16-SEP-9	12:01:53,	14700	4.1	31.869	-21.23	104.68	-2.26	61.442	-1.013	90.879	-0.617	90.01	-0.641
16-SEP-9	12:06:53,	15000	4.2	31.861	-21.238	104.69	-2.25	61.442	-1.013	90.896	-0.6	90.043	-0.608
16-SEP-9	12:11:53,	15300	4.3	31.92	-21.179	104.72	-2.22	61.484	-0.971	90.939	-0.557	90.035	-0.616
16-SEP-9	12:16:53,	15600	4.3	31.853	-21.246	104.69	-2.25	61.459	-0.996	90.93	-0.566	90.018	-0.633
16-SEP-9	12:21:53,	15900	4.4	31.785	-21.314	104.66	-2.28	61.4	-1.055	90.879	-0.617	89.993	-0.658
16-SEP-9	12:26:53,	16200	4.5	31.743	-21.356	104.64	-2.3	61.4	-1.055	90.854	-0.642	89.967	-0.684
16-SEP-9	12:31:53,	16500	4.6	31.751	-21.348	104.65	-2.29	61.4	-1.055	90.854	-0.642	89.984	-0.667
16-SEP-9	12:36:53,	16800	4.7	31.743	-21.356	104.66	-2.28	61.467	-0.988	90.905	-0.591	90.027	-0.624
16-SEP-9	12:41:53,	17100	4.8	31.709	-21.39	104.64	-2.3	61.408	-1.047	90.871	-0.625	90.001	-0.65
16-SEP-9	12:46:53,	17400	4.8	31.692	-21.407	104.64	-2.3	61.374	-1.081	90.854	-0.642	89.951	-0.7
16-SEP-9	12:51:53,	17700	4.9	31.582	-21.517	104.58	-2.36	61.358	-1.097	90.871	-0.625	89.925	-0.726
16-SEP-9	12:56:53,	18000	5.0	31.54	-21.559	104.58	-2.36	61.341	-1.114	90.82	-0.676	89.942	-0.709
16-SEP-9	13:01:53,	18300	5.1	31.54	-21.559	104.59	-2.35	61.332	-1.123	90.863	-0.633	89.959	-0.692
16-SEP-9	13:06:53,	18600	5.2	31.574	-21.525	104.63	-2.31	61.366	-1.089	90.854	-0.642	89.967	-0.684
16-SEP-9	13:11:53,	18900	5.3	31.608	-21.491	104.58	-2.36	61.273	-1.182	90.803	-0.693	89.883	-0.768
16-SEP-9	13:16:53,	19200	5.3	31.54	-21.559	104.57	-2.37	61.273	-1.182	90.803	-0.693	89.908	-0.743
16-SEP-9	13:21:53,	19500	5.4	31.481	-21.618	104.55	-2.39	61.273	-1.182	90.803	-0.693	89.917	-0.734
16-SEP-9	13:26:53,	19800	5.5	31.464	-21.635	104.59	-2.35	61.315	-1.14	90.82	-0.676	89.934	-0.717
16-SEP-9	13:31:53,	20100	5.6	31.363	-21.736	104.54	-2.4	61.273	-1.182	90.787	-0.709	89.891	-0.76

Table E.1 50 GPM Water Level Drawdown Data

	Time	Time (hrs)	PR-1	PR-1 Corrected	WT-17	WT-17 Corrected	WT-13	WT-13 Corrected	OW-1	OW-1 corrected	OW-2	OW-2 corrected
16-SEP-9 07:56:53,	0	0.0	53.099	0	106.94	0	62.455	0	91.496	0	90.651	0
16-SEP-9 08:01:53,	300	0.1	53.099	0	106.97	0.03	62.472	0.017	91.521	0.025	90.651	0
16-SEP-9 08:06:53,	600	0.2	53.014	-0.085	106.92	-0.02	62.447	-0.008	91.471	-0.025	90.618	-0.033
16-SEP-9 08:11:53,	900	0.3	24.514	-28.585	106.18	-0.76	62.354	-0.101	91.454	-0.042	90.618	-0.033
16-SEP-9 08:16:53,	1200	0.3	36.717	-16.382	105.79	-1.15	62.244	-0.211	91.42	-0.076	90.601	-0.05
16-SEP-9 08:21:53,	1500	0.4	39.495	-13.604	106.05	-0.89	62.236	-0.219	91.411	-0.085	90.567	-0.084
16-SEP-9 08:26:53,	1800	0.5	33.879	-19.22	105.63	-1.31	62.126	-0.329	91.344	-0.152	90.508	-0.143
16-SEP-9 08:31:53,	2100	0.6	33.769	-19.33	105.54	-1.4	62.109	-0.346	91.352	-0.144	90.542	-0.109
16-SEP-9 08:36:53,	2400	0.7	49.628	-3.471	105.57	-1.37	62.042	-0.413	91.293	-0.203	90.466	-0.185
16-SEP-9 08:41:53,	2700	0.8	34.453	-18.646	105.7	-1.24	62.067	-0.388	91.302	-0.194	90.466	-0.185
16-SEP-9 08:46:53,	3000	0.8	33.719	-19.38	105.48	-1.46	62.05	-0.405	91.344	-0.152	90.474	-0.177
16-SEP-9 08:51:53,	3300	0.9	33.482	-19.617	105.37	-1.57	62.016	-0.439	91.293	-0.203	90.457	-0.194
16-SEP-9 08:56:53,	3600	1.0	33.288	-19.811	105.29	-1.65	61.949	-0.506	91.234	-0.262	90.415	-0.236
16-SEP-9 09:01:53,	3900	1.1	33.204	-19.895	105.24	-1.7	61.949	-0.506	91.217	-0.279	90.415	-0.236
16-SEP-9 09:06:53,	4200	1.2	33.161	-19.938	105.24	-1.7	61.957	-0.498	91.259	-0.237	90.423	-0.228
16-SEP-9 09:11:53,	4500	1.3	33.094	-20.005	105.24	-1.7	61.932	-0.523	91.226	-0.27	90.39	-0.261
16-SEP-9 09:16:53,	4800	1.3	33.009	-20.09	105.18	-1.76	61.89	-0.565	91.183	-0.313	90.364	-0.287
16-SEP-9 09:21:53,	5100	1.4	33.035	-20.064	105.18	-1.76	61.881	-0.574	91.175	-0.321	90.381	-0.27
16-SEP-9 09:26:53,	5400	1.5	32.908	-20.191	105.14	-1.8	61.847	-0.608	91.167	-0.329	90.331	-0.32
16-SEP-9 09:31:53,	5700	1.6	32.866	-20.233	105.11	-1.83	61.814	-0.641	91.141	-0.355	90.356	-0.295
16-SEP-9 09:36:53,	6000	1.7	32.798	-20.301	105.07	-1.87	61.805	-0.65	91.133	-0.363	90.297	-0.354
16-SEP-9 09:41:53,	6300	1.8	32.714	-20.385	105.03	-1.91	61.754	-0.701	91.082	-0.414	90.255	-0.396
16-SEP-9 09:46:53,	6600	1.8	32.756	-20.343	105.06	-1.88	61.78	-0.675	91.124	-0.372	90.297	-0.354
16-SEP-9 09:51:53,	6900	1.9	32.663	-20.436	105	-1.94	61.729	-0.726	91.091	-0.405	90.322	-0.329
16-SEP-9 09:56:53,	7200	2.0	32.663	-20.436	104.97	-1.97	61.712	-0.743	91.074	-0.422	90.221	-0.43
16-SEP-9 10:01:53,	7500	2.1	32.579	-20.52	104.96	-1.98	61.712	-0.743	91.065	-0.431	90.212	-0.439
16-SEP-9 10:06:53,	7800	2.2	32.587	-20.512	104.95	-1.99	61.695	-0.76	91.065	-0.431	90.204	-0.447
16-SEP-9 10:11:53,	8100	2.3	32.537	-20.562	104.96	-1.98	61.695	-0.76	91.057	-0.439	90.204	-0.447
16-SEP-9 10:16:53,	8400	2.3	32.537	-20.562	104.94	-2	61.695	-0.76	91.065	-0.431	90.221	-0.43
16-SEP-9 10:21:53,	8700	2.4	32.461	-20.638	104.91	-2.03	61.678	-0.777	91.04	-0.456	90.212	-0.439
16-SEP-9 10:26:53,	9000	2.5	32.427	-20.672	104.9	-2.04	61.662	-0.793	91.023	-0.473	90.179	-0.472
16-SEP-9 10:31:53,	9300	2.6	32.385	-20.714	104.91	-2.03	61.67	-0.785	91.048	-0.448	90.221	-0.43
16-SEP-9 10:36:53,	9600	2.7	32.376	-20.723	104.88	-2.06	61.653	-0.802	91.031	-0.465	90.187	-0.464
16-SEP-9 10:41:53,	9900	2.8	32.368	-20.731	104.89	-2.05	61.636	-0.819	91.031	-0.465	90.162	-0.489

Figure E.1 50 GPM Water Level Drawdowns
Product Recovery Pilot Study



APPENDIX F

PRODUCT RECOVERY PILOT STUDY
GROUNDWATER SAMPLE LABORATORY RESULTS

Barnstable County Health and Environmental Laboratory Analytical Report

PILOT STUDY WATER SAMPLES

SITE:	MMR
LOCATION:	FS-12
DEPTH:	
SAMPLE NUMBER:	PRI-A-091693-1
LAB SAMPLE NO.:	93-2022-01
MATRIX:	WATER
METHOD BLANK (MB):	_____
TRIP BLANK (TB):	_____
FIELD BLANK (FB):	_____
EQUIP. RINSEATE (ER):	_____
DATE SAMPLED:	09/16/93
DATE RECEIVED:	09/16/93
DATE ANALYZED:	09/16/93

	CROL	
BENZENE	2	BDL
TOULENE	2	BDL
ETHYLBENZENE	2	BDL
XYLENES	2	BDL

UNITS	ug/L
Level	_____
Dilution Factor:	_____
Percent Solids, (%)	_____
Sample Weight(grams)	_____

NOTE:

Barnstable County Health and Environmental Laboratory Analytical Report

PILOT STUDY WATER SAMPLES

SITE:	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12
LOCATION:					
DEPTH:					
SAMPLE NUMBER:	PRI-A-091693-2	PRI-A-091693-2-D	PRI-B-091793-1	PRI-I-091793-1	PRI-A-091793-1
LAB SAMPLE NO.:	93-2027-01	93-2027-02	93-2030-01	93-2030-02	93-2030-03
MATRIX:	WATER	WATER	WATER	WATER	WATER
METHOD BLANK (MB):					
TRIP BLANK (TB):					
FIELD BLANK (FB):					
EQUIP. RINSEATE (ER):					
DATE SAMPLED:	09/16/93	09/16/93	09/17/93	09/17/93	09/17/93
DATE RECEIVED:	09/16/93	09/16/93	09/17/93	09/17/93	09/17/93
DATE ANALYZED:	09/16/93	09/16/93	09/17/93	09/17/93	09/17/93

	CRQL				
BENZENE	2	BDL	BDL	46.4	BDL
TOULENE	2	BDL	BDL	10300	85.8
ETHYLBENZENE	2	BDL	BDL	944	7.9
XYLENES	2	BDL	BDL	721	54.5

UNITS					
Level		ug/L	ug/L	ug/L	ug/L
Dilution Factor:					
Percent Solids, (%)					
Sample Weight(grams)					

NOTE:

Barnstable County Health and Environmental Laboratory Analytical Report

[illegible]

PILOT STUDY WATER SAMPLES

	CRQL	CRQL	CRQL	CRQL	CRQL
BENZENE	2	BDL	BDL	BDL	BDL
TOULENE	2	5.1	BDL	6.0	7.2
ETHYLBENZENE	2	BDL	BDL	BDL	0.5
XYLENES	2	2.3	BDL	2.6	3.4

NOTE:

Barnstable County Health and Environmental Laboratory Analytical Report

PILOT STUDY WATER SAMPLES

SITE:	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12
LOCATION:					
DEPTH:					
SAMPLE NUMBER:	PRI-B-092193-1	PRI-B-092193-1-D	PRI-I-092193-1	PRI-I-092193-1-D	TB-092193-1
LAB SAMPLE NO.:	93-2066-03	93-2066-02	93-2066-04	93-2066-01	93-2066-05
MATRIX:	WATER	WATER	WATER	WATER	WATER
METHOD BLANK (MB):					
TRIP BLANK (TB):					
FIELD BLANK (FB):					
EQUIP. RINSEATE (ER):					
DATE SAMPLED:	09/21/93	09/21/93	09/21/93	09/21/93	09/21/93
DATE RECEIVED:	09/21/93	09/21/93	09/21/93	09/21/93	09/21/93
DATE ANALYZED:	09/21/93	09/21/93	09/21/93	09/21/93	09/21/93

	CRQL				
BENZENE	2	48.7	51.2	20.6	18.5
TOULENE	2	6100	6200	3800	3930
ETHYLBENZENE	2	590	580	265	280
XYLENES	2	2400	2400	1300	1300

UNITS		ug/L	ug/L	ug/L	ug/L
Level					
Dilution Factor:					
Percent Solids, (%)					
Sample Weight(grams)					

NOTE:

Barnstable County Health and Environmental Laboratory Analytical Report

PILOT STUDY WATER SAMPLES

SITE:

LOCATION:

DEPTH:

SAMPLE NUMBER:

LAB SAMPLE NO.:

MATRIX:

METHOD BLANK (MB):

TRIP BLANK (TB):

FIELD BLANK (FB):

EQUIP. RINSEATE (ER):

DATE SAMPLED:

DATE RECEIVED:

DATE ANALYZED:

MMR
FS-12

MMR
FS-12

MMR
FS-12

MMR
FS-12

MMR
FS-12

PRI-I-092193-2
93-2079-01
WATER

TB-092193-2
93-2079-02
WATER

PRI-B-092293-1
93-2083-01
WATER

PRI-I-092293-1
93-2083-02
WATER

TB-092293-1
93-2083-04
WATER

09/21/93
09/21/93
09/22/93

09/21/93
09/21/93
09/22/93

09/22/93
09/22/93
09/22/93

09/22/93
09/22/93
09/22/93

09/22/93
09/22/93
09/22/93

CRQL

BENZENE

2

29.0

BDL

45.5

2.5

BDL

TOULENE

2

13000

BDL

10800

1800

BDL

ETHYLBENZENE

2

1100

BDL

1200

190

BDL

XYLENES

2

4300

BDL

4250

180

BDL

UNITS

Level

Dilution Factor:

Percent Solids, (%)

Sample Weight(grams)

ug/L

ug/L

ug/L

ug/L

ug/L

NOTE:

Barnstable County Health and Environmental Laboratory Analytical Report

PILOT STUDY WATER SAMPLES

SITE:	MMR	MMR	MMR	MMR	MMR
LOCATION:	FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:					
SAMPLE NUMBER:	PRI-I-092293-2	TB-092293-2	PRI-B-092393-1	PRI-I-092393-1	TB-092393-1
LAB SAMPLE NO.:	93-2101-01	93-2101-02	93-2107-01	93-2107-02	93-2107-04
MATRIX:	WATER	WATER	WATER	WATER	WATER
METHOD BLANK (MB):					
TRIP BLANK (TB):					
FIELD BLANK (FB):					
EQUIP. RINSEATE (ER):					
DATE SAMPLED:	09/22/93	09/22/93	09/23/93	09/23/93	09/23/93
DATE RECEIVED:	09/22/93	09/22/93	09/23/93	09/23/93	09/23/93
DATE ANALYZED:	09/22/93	09/22/93	09/23/93	09/23/93	09/23/93

CONCENTRATION	CRCL	CONCENTRATION	CONCENTRATION	CONCENTRATION	CONCENTRATION
BENZENE	2	2.9	BDL	32.0	2.7
TOULENE	2	1400	BDL	10900	1300
ETHYLBENZENE	2	150	BDL	1300	140
XYLENES	2	610	BDL	4350	510

UNITS	ug/L	ug/L	ug/L	ug/L	ug/L
Level					
Dilution Factor:					
Percent Solids, (%)					
Sample Weight(grams)					

NOTE:

APPENDIX G
SOIL VAPOR EXTRACTION FIELD LOGS
AIR READINGS
AND
OPERATING PARAMETERS

Recorded by 12el

[illegible]

[illegible]

Date: 9/27/95

Test No. 50-2

Recorded by 124

~~1.444~~ 1.444 - WT-17

1.444
0.9542 - OW-1

0.9542 - 0.9542

1.7227-OW-2

SOIL VAPOR EXTRACTION - OPERATING PARAMETERS

[illegible]

* adjusted to 3.5"

PR-1 | 1.781 | - 0.18

- WT-17	1.444	0.954
---------	-------	-------

ST-13	1.7987	1.56
-------	--------	------

OW-1	0.9542	0.827
------	--------	-------

- ow-2	1.7227	1.65
--------	--------	------

Date: _____

Test No.

Recorded by

SOIL VAPOR EXTRACTION - O₂, CO₂, AND OVM READINGS

[illegible]

* CO₂ O₂ METER NOT HOOKED UP to right connection.
CONNECTION CORRECTION MADE - Rel 10:48

Background 0.4 to 0.7 ppm

Date: 9/30/93

Test No. VS-3

Recorded by Reh

SOIL VAPOR EXTRACTION - OPERATING PARAMETERS

[illegible]

PR-1 1.8.66

WT-17 1.503

WT-13 1.83

OW-1 1.216

OW-2 1.790

Recorded by Reh

[illegible]

Recorded by Reh

SOIL VAPOR EXTRACTION - OPERATING PARAMETERS

[illegible]

START

STOP
DOWN
OK
ever

1.916
1.2667
1.739
1.165
1.4693

Date: 10-1-93

Test No. VS-4

Recorded by Rel

SOIL VAPOR EXTRACTION - O₂, CO₂, AND OVM READINGS

[illegible]

APPENDIX H
SOIL VAPOR EXTRACTION PILOT STUDY
AIR PRESSURE DATA

Table H.1 100 CFM Air Pressure Data

Time (sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
0	0.00	1.588	0.000	1.892	0.000	1.165	0.000	1.866	0.000
30	0.01	1.545	-0.042	1.883	-0.008	0.996	-0.169	1.757	-0.110
60	0.02	1.478	-0.110	1.816	-0.076	0.895	-0.270	1.740	-0.127
90	0.03	1.343	-0.245	1.680	-0.211	0.659	-0.507	1.680	-0.186
120	0.03	1.292	-0.296	1.638	-0.253	0.608	-0.557	1.630	-0.236
150	0.04	1.123	-0.464	1.613	-0.279	0.743	-0.422	1.630	-0.236
180	0.05	0.971	-0.616	1.604	-0.287	0.819	-0.346	1.562	-0.304
210	0.06	0.878	-0.709	1.545	-0.346	0.701	-0.464	1.554	-0.312
240	0.07	0.828	-0.760	1.528	-0.363	0.743	-0.422	1.562	-0.304
270	0.08	0.853	-0.735	1.528	-0.363	0.659	-0.507	1.613	-0.253
300	0.08	0.878	-0.709	1.528	-0.363	0.583	-0.583	1.613	-0.253
330	0.09	0.920	-0.667	1.562	-0.329	0.768	-0.397	1.672	-0.194
360	0.10	0.912	-0.676	1.588	-0.304	0.828	-0.338	1.697	-0.169
390	0.11	0.954	-0.633	1.588	-0.304	0.768	-0.397	1.757	-0.110
420	0.12	0.980	-0.608	1.588	-0.304	0.701	-0.464	1.816	-0.051
450	0.13	1.064	-0.524	1.680	-0.211	0.912	-0.253	1.866	0.000
480	0.13	1.056	-0.532	1.714	-0.177	0.963	-0.203	1.900	0.034
510	0.14	1.056	-0.532	1.714	-0.177	0.971	-0.194	1.892	0.025
540	0.15	1.148	-0.439	1.714	-0.177	0.980	-0.186	1.866	0.000
570	0.16	1.275	-0.313	1.757	-0.135	0.912	-0.253	1.883	0.017
600	0.17	1.300	-0.287	1.799	-0.093	0.996	-0.169	1.875	0.008
630	0.18	1.360	-0.228	1.816	-0.076	0.954	-0.211	1.968	0.101
660	0.18	1.334	-0.253	1.858	-0.034	0.996	-0.169	1.993	0.127
690	0.19	1.393	-0.194	1.909	0.017	1.089	-0.076	1.976	0.110
720	0.20	1.351	-0.236	1.917	0.025	1.148	-0.017	1.951	0.085
750	0.21	1.402	-0.186	1.909	0.017	1.208	0.042	1.900	0.034
780	0.22	1.385	-0.203	1.934	0.042	1.275	0.110	1.917	0.051
810	0.23	1.444	-0.144	1.993	0.101	1.292	0.127	1.951	0.085
840	0.23	1.419	-0.169	1.925	0.034	1.140	-0.025	1.934	0.068
870	0.24	1.469	-0.118	1.968	0.076	1.216	0.051	1.976	0.110
900	0.25	1.469	-0.118	1.959	0.068	1.275	0.110	2.018	0.152
930	0.26	1.503	-0.084	1.976	0.084	1.258	0.093	2.010	0.144
960	0.27	1.520	-0.068	1.976	0.084	1.191	0.025	1.993	0.127
990	0.28	1.461	-0.127	1.968	0.076	1.165	0.000	1.959	0.093

Table H.1 100 CFM Air Pressure Data

Time (sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
1020	0.28	1.444	-0.144	1.951	0.059	1.216	0.051	1.951	0.085
1050	0.29	1.402	-0.186	1.976	0.084	1.191	0.025	1.925	0.059
1080	0.30	1.461	-0.127	1.985	0.093	1.165	0.000	1.985	0.118
1110	0.31	1.419	-0.169	1.959	0.068	1.140	-0.025	1.976	0.110
1140	0.32	1.469	-0.118	1.951	0.059	1.148	-0.017	1.985	0.118
1170	0.33	1.393	-0.194	1.959	0.068	1.334	0.169	2.027	0.160
1200	0.33	1.461	-0.127	1.976	0.084	1.267	0.101	2.001	0.135
1230	0.34	1.444	-0.144	1.976	0.084	1.233	0.068	1.959	0.093
1260	0.35	1.393	-0.194	1.968	0.076	1.208	0.042	1.993	0.127
1290	0.36	1.528	-0.059	2.001	0.110	1.208	0.042	2.010	0.144
1320	0.37	1.520	-0.068	1.976	0.084	1.208	0.042	2.010	0.144
1350	0.38	1.512	-0.076	1.968	0.076	1.174	0.008	2.027	0.160
1380	0.38	1.588	0.000	1.993	0.101	1.182	0.017	2.027	0.160
1410	0.39	1.520	-0.068	2.001	0.110	1.224	0.059	2.010	0.144
1440	0.40	1.503	-0.084	2.010	0.118	1.233	0.068	2.035	0.169
1470	0.41	1.503	-0.084	1.993	0.101	1.174	0.008	2.035	0.169
1500	0.42	1.503	-0.084	1.968	0.076	1.165	0.000	1.976	0.110
1530	0.43	1.571	-0.017	1.968	0.076	1.106	-0.059	1.959	0.093
1560	0.43	1.630	0.042	2.035	0.143	1.208	0.042	1.968	0.101
1590	0.44	1.588	0.000	2.018	0.127	1.267	0.101	1.968	0.101
1620	0.45	1.528	-0.059	2.044	0.152	1.351	0.186	1.976	0.110
1650	0.46	1.604	0.017	2.027	0.135	1.292	0.127	2.010	0.144
1680	0.47	1.588	0.000	2.001	0.110	1.208	0.042	2.027	0.160
1710	0.48	1.588	0.000	2.010	0.118	1.191	0.025	2.069	0.203
1740	0.48	1.562	-0.025	2.018	0.127	1.275	0.110	1.993	0.127
1770	0.49	1.672	0.084	2.061	0.169	1.385	0.220	2.001	0.135
1800	0.50	1.562	-0.025	2.010	0.118	1.317	0.152	2.086	0.220
1830	0.51	1.613	0.025	2.018	0.127	1.292	0.127	2.052	0.186
1860	0.52	1.588	0.000	2.018	0.127	1.267	0.101	2.103	0.236
1890	0.53	1.520	-0.068	1.993	0.101	1.208	0.042	2.044	0.177
1920	0.53	1.503	-0.084	1.976	0.084	1.208	0.042	1.993	0.127
1950	0.54	1.520	-0.068	1.976	0.084	1.208	0.042	1.942	0.076
1980	0.55	1.486	-0.101	1.985	0.093	1.233	0.068	1.909	0.042
2010	0.56	1.461	-0.127	1.976	0.084	1.250	0.085	1.892	0.025

Table H.1 100 CFM Air Pressure Data

Time (sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
2040	0.57	1.444	-0.144	1.951	0.059	1.208	0.042	1.925	0.059
2070	0.58	1.469	-0.118	1.951	0.059	1.140	-0.025	1.951	0.085
2100	0.58	1.503	-0.084	2.001	0.110	1.208	0.042	1.985	0.118
2130	0.59	1.512	-0.076	2.001	0.110	1.258	0.093	1.951	0.085
2160	0.60	1.554	-0.034	1.993	0.101	1.208	0.042	1.934	0.068
2190	0.61	1.503	-0.084	2.001	0.110	1.208	0.042	1.968	0.101
2220	0.62	1.512	-0.076	1.993	0.101	1.165	0.000	1.951	0.085
2250	0.63	1.503	-0.084	2.001	0.110	1.165	0.000	1.985	0.118
2280	0.63	1.503	-0.084	2.001	0.110	1.182	0.017	1.959	0.093
2310	0.64	1.588	0.000	2.001	0.110	1.216	0.051	1.985	0.118
2340	0.65	1.588	0.000	2.010	0.118	1.208	0.042	2.001	0.135
2370	0.66	1.588	0.000	2.001	0.110	1.182	0.017	2.052	0.186
2400	0.67	1.655	0.068	2.035	0.143	1.267	0.101	1.959	0.093
2430	0.68	1.596	0.008	2.035	0.143	1.300	0.135	2.001	0.135
2460	0.68	1.697	0.110	2.044	0.152	1.300	0.135	2.145	0.279
2490	0.69	1.638	0.051	2.027	0.135	1.300	0.135	2.069	0.203
2520	0.70	1.596	0.008	2.018	0.127	1.224	0.059	2.018	0.152
2550	0.71	1.655	0.068	2.010	0.118	1.233	0.068	2.069	0.203
2580	0.72	1.588	0.000	2.010	0.118	1.208	0.042	2.069	0.203
2610	0.73	1.613	0.025	2.035	0.143	1.275	0.110	2.027	0.160
2640	0.73	1.613	0.025	2.052	0.160	1.275	0.110	2.069	0.203
2670	0.74	1.596	0.008	2.018	0.127	1.216	0.051	2.103	0.236
2700	0.75	1.571	-0.017	2.018	0.127	1.165	0.000	2.035	0.169
2730	0.76	1.588	0.000	2.035	0.143	1.258	0.093	1.985	0.118
2760	0.77	1.588	0.000	2.044	0.152	1.275	0.110	2.086	0.220
2790	0.78	1.545	-0.042	2.018	0.127	1.275	0.110	2.111	0.245
2820	0.78	1.571	-0.017	2.044	0.152	1.250	0.085	2.145	0.279
2850	0.79	1.613	0.025	2.035	0.143	1.292	0.127	2.153	0.287
2880	0.80	1.545	-0.042	1.993	0.101	1.258	0.093	2.111	0.245
2910	0.81	1.520	-0.068	1.968	0.076	1.208	0.042	2.052	0.186
2940	0.82	1.588	0.000	1.968	0.076	1.224	0.059	2.077	0.211
2970	0.83	1.588	0.000	2.001	0.110	1.224	0.059	2.077	0.211
3000	0.83	1.588	0.000	2.018	0.127	1.275	0.110	2.086	0.220
3030	0.84	1.596	0.008	2.001	0.110	1.275	0.110	2.061	0.194

Table H.1 100 CFM Air Pressure Data

Time (sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
3060	0.85	1.562	-0.025	1.993	0.101	1.233	0.068	2.111	0.245
3090	0.86	1.554	-0.034	1.985	0.093	1.224	0.059	2.111	0.245
3120	0.87	1.545	-0.042	1.959	0.068	1.208	0.042	2.061	0.194
3150	0.88	1.478	-0.110	1.959	0.068	1.174	0.008	2.018	0.152
3180	0.88	1.512	-0.076	1.942	0.051	1.123	-0.042	1.985	0.118
3210	0.89	1.486	-0.101	1.968	0.076	1.089	-0.076	1.976	0.110
3240	0.90	1.486	-0.101	1.959	0.068	1.098	-0.067	2.001	0.135
3270	0.91	1.554	-0.034	1.951	0.059	1.123	-0.042	2.044	0.177
3300	0.92	1.571	-0.017	1.959	0.068	1.174	0.008	2.052	0.186
3330	0.93	1.545	-0.042	1.985	0.093	1.182	0.017	2.044	0.177
3360	0.93	1.596	0.008	2.052	0.160	1.258	0.093	2.077	0.211
3390	0.94	1.596	0.008	2.035	0.143	1.233	0.068	2.103	0.236
3420	0.95	1.604	0.017	2.035	0.143	1.275	0.110	2.103	0.236
3450	0.96	1.562	-0.025	2.027	0.135	1.300	0.135	2.086	0.220
3480	0.97	1.588	0.000	2.044	0.152	1.250	0.085	2.103	0.236
3510	0.98	1.545	-0.042	1.993	0.101	1.250	0.085	2.069	0.203
3540	0.98	1.596	0.008	2.010	0.118	1.267	0.101	2.035	0.169
3570	0.99	1.571	-0.017	2.001	0.110	1.233	0.068	2.027	0.160
3870	1.08	1.545	-0.042	2.061	0.169	1.292	0.127	2.001	0.135
4170	1.16	1.630	0.042	2.103	0.211	1.317	0.152	2.027	0.160
4470	1.24	1.554	-0.034	1.993	0.101	1.182	0.017	2.001	0.135
4770	1.33	1.503	-0.084	1.993	0.101	1.191	0.025	2.018	0.152
5070	1.41	1.588	0.000	2.027	0.135	1.216	0.051	2.010	0.144
5370	1.49	1.520	-0.068	1.993	0.101	1.191	0.025	1.993	0.127
5670	1.58	1.554	-0.034	1.976	0.084	1.165	0.000	1.985	0.118
5970	1.66	1.588	0.000	2.001	0.110	1.258	0.093	2.128	0.262
6270	1.74	1.469	-0.118	1.925	0.034	1.098	-0.067	2.018	0.152
6570	1.83	1.512	-0.076	1.968	0.076	1.174	0.008	2.086	0.220
6870	1.91	1.554	-0.034	1.993	0.101	1.208	0.042	2.018	0.152
7170	1.99	1.503	-0.084	2.010	0.118	1.208	0.042	1.993	0.127
7470	2.08	1.528	-0.059	1.976	0.084	1.182	0.017	1.976	0.110
7770	2.16	1.528	-0.059	1.976	0.084	1.165	0.000	1.968	0.101
8070	2.24	1.528	-0.059	1.985	0.093	1.191	0.025	1.959	0.093
8370	2.33	1.478	-0.110	1.942	0.051	1.165	0.000	1.934	0.068

Table H.2 150 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
1020	0.28	1.0049	-0.456	1.5876	-0.228	0.81911	-0.17734	1.6129	0
1050	0.29	1.0387	-0.4222	1.5876	-0.228	0.836	-0.16045	1.5031	-0.1098
1080	0.30	1.0218	-0.4391	1.5707	-0.2449	0.836	-0.16045	1.5031	-0.1098
1110	0.31	0.99645	-0.46445	1.5453	-0.2703	0.82756	-0.16889	1.4609	-0.152
1140	0.32	1.0049	-0.456	1.5538	-0.2618	0.81911	-0.17734	1.4609	-0.152
1170	0.33	0.99645	-0.46445	1.5538	-0.2618	0.82756	-0.16889	1.4862	-0.1267
1200	0.33	1.0387	-0.4222	1.5453	-0.2703	0.85289	-0.14356	1.5116	-0.1013
1230	0.34	1.0133	-0.4476	1.5453	-0.2703	0.85289	-0.14356	1.4609	-0.152
1260	0.35	1.0049	-0.456	1.5876	-0.228	0.85289	-0.14356	1.4862	-0.1267
1290	0.36	1.0049	-0.456	1.5453	-0.2703	0.82756	-0.16889	1.4609	-0.152
1320	0.37	1.0049	-0.456	1.5453	-0.2703	0.85289	-0.14356	1.5031	-0.1098
1350	0.38	0.99645	-0.46445	1.5453	-0.2703	0.85289	-0.14356	1.4778	-0.1351
1380	0.38	1.0049	-0.456	1.5538	-0.2618	0.836	-0.16045	1.5031	-0.1098
1410	0.39	1.0049	-0.456	1.5707	-0.2449	0.82756	-0.16889	1.5031	-0.1098
1440	0.40	0.99645	-0.46445	1.5538	-0.2618	0.81067	-0.18578	1.4862	-0.1267
1470	0.41	0.99645	-0.46445	1.5453	-0.2703	0.78534	-0.21111	1.4693	-0.1436
1500	0.42	1.0049	-0.456	1.5538	-0.2618	0.81067	-0.18578	1.4862	-0.1267
1530	0.43	1.0049	-0.456	1.5707	-0.2449	0.81911	-0.17734	1.4862	-0.1267
1560	0.43	0.99645	-0.46445	1.5453	-0.2703	0.836	-0.16045	1.4862	-0.1267
1590	0.44	0.99645	-0.46445	1.5707	-0.2449	0.82756	-0.16889	1.4778	-0.1351
1620	0.45	0.99645	-0.46445	1.6129	-0.2027	0.836	-0.16045	1.5284	-0.0845
1650	0.46	0.99645	-0.46445	1.5707	-0.2449	0.836	-0.16045	1.5031	-0.1098
1680	0.47	0.99645	-0.46445	1.5453	-0.2703	0.85289	-0.14356	1.5116	-0.1013
1710	0.48	0.99645	-0.46445	1.5116	-0.304	0.836	-0.16045	1.4778	-0.1351
1740	0.48	0.99645	-0.46445	1.5284	-0.2872	0.82756	-0.16889	1.4609	-0.152
1770	0.49	0.97956	-0.48134	1.5284	-0.2872	0.836	-0.16045	1.4609	-0.152
1800	0.50	0.97111	-0.48979	1.5453	-0.2703	0.836	-0.16045	1.4693	-0.1436
1830	0.51	0.97111	-0.48979	1.5284	-0.2872	0.82756	-0.16889	1.4356	-0.1773
1860	0.52	0.99645	-0.46445	1.5453	-0.2703	0.82756	-0.16889	1.4862	-0.1267
1890	0.53	0.99645	-0.46445	1.5453	-0.2703	0.82756	-0.16889	1.4778	-0.1351
1920	0.53	0.97111	-0.48979	1.5453	-0.2703	0.82756	-0.16889	1.4862	-0.1267
1950	0.54	0.97956	-0.48134	1.5453	-0.2703	0.836	-0.16045	1.5031	-0.1098
1980	0.55	0.99645	-0.46445	1.5538	-0.2618	0.836	-0.16045	1.5116	-0.1013
2010	0.56	0.99645	-0.46445	1.5453	-0.2703	0.81911	-0.17734	1.5031	-0.1098

Table H.2 150 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
2040	0.57	1.0133	-0.4476	1.5622	-0.2534	0.836	-0.16045	1.5453	-0.0676
2070	0.58	1.0471	-0.4138	1.5876	-0.228	0.85289	-0.14356	1.5031	-0.1098
2100	0.58	1.0049	-0.456	1.6044	-0.2112	0.85289	-0.14356	1.4778	-0.1351
2130	0.59	1.0049	-0.456	1.5453	-0.2703	0.82756	-0.16889	1.5031	-0.1098
2160	0.60	1.0049	-0.456	1.5707	-0.2449	0.87823	-0.11822	1.5031	-0.1098
2190	0.61	0.99645	-0.46445	1.5453	-0.2703	0.82756	-0.16889	1.5031	-0.1098
2220	0.62	1.0049	-0.456	1.5453	-0.2703	0.86134	-0.13511	1.4778	-0.1351
2250	0.63	1.0049	-0.456	1.5707	-0.2449	0.85289	-0.14356	1.5031	-0.1098
2280	0.63	1.0218	-0.4391	1.6382	-0.1774	0.89511	-0.10134	1.5031	-0.1098
2310	0.64	1.0049	-0.456	1.6129	-0.2027	0.912	-0.08445	1.4862	-0.1267
2340	0.65	1.0049	-0.456	1.5622	-0.2534	0.86978	-0.12667	1.5031	-0.1098
2370	0.66	0.97111	-0.48979	1.5876	-0.228	0.87823	-0.11822	1.5031	-0.1098
2400	0.67	0.95423	-0.50667	1.5876	-0.228	0.86978	-0.12667	1.4609	-0.152
2430	0.68	0.96267	-0.49823	1.5876	-0.228	0.86978	-0.12667	1.4609	-0.152
2460	0.68	0.912	-0.5489	1.5876	-0.228	0.87823	-0.11822	1.5284	-0.0845
2490	0.69	0.92889	-0.53201	1.6382	-0.1774	0.86978	-0.12667	1.52	-0.0929
2520	0.70	0.92045	-0.54045	1.6298	-0.1858	0.86978	-0.12667	1.4862	-0.1267
2550	0.71	0.92045	-0.54045	1.6551	-0.1605	0.88667	-0.10978	1.444	-0.1689
2580	0.72	0.95423	-0.50667	1.6467	-0.1689	0.912	-0.08445	1.4187	-0.1942
2610	0.73	0.89511	-0.56579	1.5876	-0.228	0.87823	-0.11822	1.4187	-0.1942
2640	0.73	0.86978	-0.59112	1.5707	-0.2449	0.85289	-0.14356	1.4609	-0.152
2670	0.74	0.97956	-0.48134	1.596	-0.2196	0.86978	-0.12667	1.4356	-0.1773
2700	0.75	0.96267	-0.49823	1.6298	-0.1858	0.86978	-0.12667	1.4187	-0.1942
2730	0.76	0.912	-0.5489	1.6467	-0.1689	0.912	-0.08445	1.4693	-0.1436
2760	0.77	0.96267	-0.49823	1.6129	-0.2027	0.89511	-0.10134	1.4609	-0.152
2790	0.78	0.99645	-0.46445	1.6382	-0.1774	0.92045	-0.076	1.4187	-0.1942
2820	0.78	0.92889	-0.53201	1.6382	-0.1774	0.86978	-0.12667	1.3849	-0.228
2850	0.79	0.95423	-0.50667	1.6044	-0.2112	0.87823	-0.11822	1.3764	-0.2365
2880	0.80	0.96267	-0.49823	1.5876	-0.228	0.87823	-0.11822	1.3764	-0.2365
2910	0.81	0.912	-0.5489	1.596	-0.2196	0.86978	-0.12667	1.3849	-0.228
2940	0.82	0.97111	-0.48979	1.5876	-0.228	0.89511	-0.10134	1.4271	-0.1858
2970	0.83	0.912	-0.5489	1.596	-0.2196	0.86134	-0.13511	1.5031	-0.1098
3000	0.83	0.95423	-0.50667	1.6044	-0.2112	0.836	-0.16045	1.4862	-0.1267
3030	0.84	0.92889	-0.53201	1.6044	-0.2112	0.82756	-0.16889	1.4609	-0.152

Table H.2 150 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
18870	5.24	1.3004	-0.1605	1.8578	0.0422	1.3764	0.37995	1.596	-0.0169
19170	5.33	1.3427	-0.1182	1.8916	0.076	1.1316	0.13515	1.52	-0.0929
19470	5.41	1.2751	-0.1858	1.8325	0.0169	1.216	0.21955	1.6973	0.0844
19770	5.49	1.292	-0.1689	1.9	0.0844	1.4018	0.40535	1.6467	0.0338
20070	5.58	1.2667	-0.1942	1.8325	0.0169	1.2076	0.21115	1.672	0.0591
20370	5.66	1.2076	-0.2533	1.8071	-0.0085	1.0809	0.08445	1.6044	-0.0085
20670	5.74	1.2329	-0.228	1.7818	-0.0338	1.1653	0.16885	1.6044	-0.0085
20970	5.83	1.3427	-0.1182	1.8493	0.0337	1.2751	0.27865	1.6551	0.0422
21270	5.91	1.292	-0.1689	1.824	0.0084	1.14	0.14355	1.6298	0.0169
21570	5.99	1.292	-0.1689	1.8325	0.0169	1.2244	0.22795	1.5876	-0.0253
21870	6.08	1.292	-0.1689	1.8831	0.0675	1.1231	0.12665	1.7142	0.1013
22170	6.16	1.2751	-0.1858	1.8493	0.0337	1.1738	0.17735	1.6129	0
22470	6.24	1.3089	-0.152	1.8662	0.0506	1.1231	0.12665	1.6298	0.0169
22770	6.33	1.0978	-0.3631	1.6889	-0.1267	1.0893	0.09285	1.6467	0.0338
23070	6.41	0.95423	-0.50667	1.5622	-0.2534	0.82756	-0.16889	1.4609	-0.152
23370	6.49	1.1316	-0.3293	1.7902	-0.0254	1.1062	0.10975	1.5031	-0.1098
23670	6.58	1.0978	-0.3631	1.7396	-0.076	1.0809	0.08445	1.5284	-0.0845
23970	6.66	1.1316	-0.3293	1.7818	-0.0338	1.2076	0.21115	1.5453	-0.0676
24270	6.74	1.1907	-0.2702	1.8071	-0.0085	1.2498	0.25335	1.5031	-0.1098
24570	6.83	1.1231	-0.3378	1.7227	-0.0929	1.0978	0.10135	1.5031	-0.1098
24870	6.91	1.2498	-0.2111	1.7311	-0.0845	1.0809	0.08445	1.5031	-0.1098
25170	6.99	1.1484	-0.3125	1.7565	-0.0591	1.1316	0.13515	1.4356	-0.1773
25470	7.08	1.1822	-0.2787	1.7396	-0.076	1.1316	0.13515	1.4862	-0.1267
25770	7.16	1.2498	-0.2111	1.824	0.0084	1.2498	0.25335	1.5876	-0.0253
26070	7.24	1.2076	-0.2533	1.7565	-0.0591	1.1738	0.17735	1.672	0.0591
26370	7.33	1.2244	-0.2365	1.7902	-0.0254	1.1653	0.16885	1.6889	0.076
26670	7.41	1.2329	-0.228	1.7649	-0.0507	1.1316	0.13515	1.5876	-0.0253
26970	7.49	1.2329	-0.228	1.8493	0.0337	1.1653	0.16885	1.6044	-0.0085
27270	7.58	1.2329	-0.228	1.7987	-0.0169	1.1653	0.16885	1.5707	-0.0422
27570	7.66	1.2076	-0.2533	1.8071	-0.0085	1.1822	0.18575	1.5622	-0.0507
27870	7.74	1.2244	-0.2365	1.8156	0	1.1653	0.16885	1.5622	-0.0507
28170	7.83	1.2498	-0.2111	1.8493	0.0337	1.2244	0.22795	1.5876	-0.0253
28470	7.91	1.2582	-0.2027	1.8409	0.0253	1.216	0.21955	1.5622	-0.0507
28770	7.99	1.3004	-0.1605	1.8156	0	1.1822	0.18575	1.5622	-0.0507

Table H.2 150 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
29070	8.08	1.2751	-0.1858	1.8493	0.0337	1.216	0.21955	1.596	-0.0169
29370	8.16	1.3511	-0.1098	1.8409	0.0253	1.2329	0.23645	1.6298	0.0169
29670	8.24	1.6044	0.1435	1.9676	0.152	1.2582	0.26175	1.6129	0
29970	8.33	1.6382	0.1773	1.9929	0.1773	1.3004	0.30395	1.6382	0.0253
30270	8.41	1.6129	0.152	1.9929	0.1773	1.3004	0.30395	1.6044	-0.0085
30570	8.49	1.6382	0.1773	1.9845	0.1689	1.292	0.29555	1.6298	0.0169
30870	8.58	1.6551	0.1942	2.0098	0.1942	1.292	0.29555	1.6382	0.0253
31170	8.66	1.6298	0.1689	1.976	0.1604	1.292	0.29555	1.6129	0
31470	8.74	1.6298	0.1689	1.9845	0.1689	1.2667	0.27025	1.6129	0
31770	8.83	1.6298	0.1689	1.976	0.1604	1.2667	0.27025	1.6382	0.0253
32070	8.91	1.6298	0.1689	1.9845	0.1689	1.292	0.29555	1.6382	0.0253
32370	8.99	1.6129	0.152	1.9845	0.1689	1.2667	0.27025	1.596	-0.0169
32670	9.08	1.5876	0.1267	1.9591	0.1435	1.2244	0.22795	1.6129	0
32970	9.16	1.6044	0.1435	1.9845	0.1689	1.3004	0.30395	1.5876	-0.0253
33270	9.24	1.6044	0.1435	1.9845	0.1689	1.2667	0.27025	1.596	-0.0169
33570	9.33	1.6298	0.1689	2.0267	0.2111	1.3089	0.31245	1.6551	0.0422
33870	9.41	1.6382	0.1773	1.9845	0.1689	1.292	0.29555	1.5876	-0.0253
34170	9.49	1.6298	0.1689	2.0013	0.1857	1.3004	0.30395	1.6298	0.0169
34470	9.58	1.6298	0.1689	1.9929	0.1773	1.3004	0.30395	1.6298	0.0169
34770	9.66	1.6044	0.1435	1.976	0.1604	1.3004	0.30395	1.6129	0
35070	9.74	1.5876	0.1267	1.9676	0.152	1.292	0.29555	1.596	-0.0169
35370	9.83	1.6129	0.152	1.9507	0.1351	1.2667	0.27025	1.5622	-0.0507
35670	9.91	1.5876	0.1267	1.9507	0.1351	1.292	0.29555	1.5876	-0.0253
35970	9.99	1.596	0.1351	1.9422	0.1266	1.2582	0.26175	1.5876	-0.0253
36270	10.08	1.596	0.1351	1.9591	0.1435	1.2667	0.27025	1.5876	-0.0253
36570	10.16	1.5707	0.1098	1.9422	0.1266	1.2498	0.25335	1.5707	-0.0422
36870	10.24	1.5876	0.1267	1.9676	0.152	1.2667	0.27025	1.5876	-0.0253
37170	10.33	1.5876	0.1267	1.9422	0.1266	1.2498	0.25335	1.5707	-0.0422
37470	10.41	1.5707	0.1098	1.9422	0.1266	1.2582	0.26175	1.5538	-0.0591
37770	10.49	1.5453	0.0844	1.9253	0.1097	1.2498	0.25335	1.52	-0.0929
38070	10.58	1.5707	0.1098	1.9422	0.1266	1.2582	0.26175	1.5538	-0.0591
38370	10.66	1.5453	0.0844	1.9253	0.1097	1.2244	0.22795	1.5453	-0.0676
38670	10.74	1.5284	0.0675	1.8916	0.076	1.216	0.21955	1.5031	-0.1098
38970	10.83	1.5031	0.0422	1.8916	0.076	1.2076	0.21115	1.5031	-0.1098

Table H.2 150 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
39270	10.91	1.52	0.0591	1.9	0.0844	1.216	0.21955	1.5284	-0.0845
39570	10.99	1.5284	0.0675	1.8916	0.076	1.216	0.21955	1.5116	-0.1013

VES2COR.WQ2

Table H.4 180 CFM Air Pressure Data (Test VES-4)

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
3090	0.858	0.828	-0.447	1.571	-0.143	1.089	-0.034	1.478	0.017
3120	0.867	0.819	-0.456	1.545	-0.169	1.056	-0.067	1.436	-0.025
3150	0.875	0.828	-0.447	1.545	-0.169	1.081	-0.042	1.427	-0.034
3180	0.883	0.828	-0.447	1.545	-0.169	1.089	-0.034	1.419	-0.042
3210	0.892	0.811	-0.464	1.554	-0.160	1.064	-0.059	1.385	-0.076
3240	0.900	0.811	-0.464	1.520	-0.194	1.039	-0.084	1.402	-0.059
3270	0.908	0.819	-0.456	1.528	-0.186	1.064	-0.059	1.436	-0.025
3300	0.917	0.811	-0.464	1.528	-0.186	1.056	-0.067	1.419	-0.042
3330	0.925	0.785	-0.490	1.520	-0.194	1.081	-0.042	1.419	-0.042
3360	0.933	0.853	-0.422	1.571	-0.143	1.081	-0.042	1.427	-0.034
3390	0.942	0.861	-0.414	1.588	-0.126	1.140	0.017	1.478	0.017
3420	0.950	0.836	-0.439	1.554	-0.160	1.123	0.000	1.528	0.067
3450	0.958	0.819	-0.456	1.554	-0.160	1.106	-0.017	1.503	0.042
3480	0.967	0.836	-0.439	1.588	-0.126	1.148	0.025	1.503	0.042
3510	0.975	0.828	-0.447	1.596	-0.118	1.123	0.000	1.503	0.042
3540	0.983	0.811	-0.464	1.596	-0.118	1.106	-0.017	1.520	0.059
3570	0.992	0.785	-0.490	1.562	-0.152	1.081	-0.042	1.512	0.051
3870	1.075	0.819	-0.456	1.588	-0.126	1.081	-0.042	1.469	0.008
4170	1.158	0.785	-0.490	1.613	-0.101	1.148	0.025	1.461	-0.000
4470	1.242	0.659	-0.616	1.613	-0.101	1.081	-0.042	1.469	0.008
4770	1.325	0.743	-0.532	1.596	-0.118	1.123	0.000	1.419	-0.042
5070	1.408	0.768	-0.507	1.562	-0.152	1.123	0.000	1.393	-0.068
5370	1.492	0.743	-0.532	1.503	-0.211	1.174	0.051	1.343	-0.118
5670	1.575	0.887	-0.388	1.461	-0.253	1.039	-0.084	1.300	-0.161
5970	1.658	0.768	-0.507	1.503	-0.211	1.056	-0.067	1.343	-0.118
6270	1.742	0.659	-0.616	1.613	-0.101	1.250	0.127	1.267	-0.194
6570	1.825	0.836	-0.439	1.655	-0.059	1.123	0.000	1.512	0.051
6870	1.908	0.828	-0.447	1.554	-0.160	1.224	0.101	1.486	0.025
7170	1.992	0.912	-0.363	1.588	-0.126	1.182	0.059	1.503	0.042
7470	2.075	0.768	-0.507	1.604	-0.110	1.216	0.093	1.393	-0.068
7770	2.158	0.811	-0.464	1.571	-0.143	1.182	0.059	1.469	0.008
8070	2.242	0.963	-0.312	1.571	-0.143	1.309	0.186	1.503	0.042
8370	2.325	0.912	-0.363	1.588	-0.126	1.216	0.093	1.503	0.042
8670	2.408	0.954	-0.321	1.697	-0.017	1.208	0.085	1.545	0.084

Table H.4 180 CFM Air Pressure Data (Test VES-4)

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
8970	2.492	0.819	-0.456	1.689	-0.025	1.174	0.051	1.512	0.051
9270	2.575	0.920	-0.355	1.588	-0.126	1.174	0.051	1.604	0.143
9570	2.658	0.870	-0.405	1.630	-0.084	1.148	0.025	1.588	0.127
9870	2.742	0.811	-0.464	1.638	-0.076	1.123	0.000	1.419	-0.042
10170	2.825	0.785	-0.490	1.757	0.042	1.258	0.135	1.512	0.051
10470	2.908	0.929	-0.346	1.630	-0.084	1.233	0.110	1.689	0.228
10770	2.992	0.954	-0.321	1.799	0.085	1.385	0.262	1.461	-0.000
11070	3.075	1.106	-0.169	1.849	0.135	1.191	0.068	1.875	0.414
11370	3.158	1.013	-0.262	1.723	0.009	1.165	0.042	1.588	0.127
11670	3.242	0.912	-0.363	1.672	-0.042	1.393	0.270	1.723	0.262
11970	3.325	1.148	-0.127	1.731	0.017	1.469	0.346	1.849	0.388
12270	3.408	1.039	-0.236	1.714	0.000	1.250	0.127	1.630	0.169
12570	3.492	0.954	-0.321	1.858	0.144	1.317	0.194	1.630	0.169
12870	3.575	1.013	-0.262	1.934	0.220	1.216	0.093	1.680	0.219
13170	3.658	0.971	-0.304	1.689	-0.025	1.317	0.194	1.512	0.051
13470	3.742	1.216	-0.059	1.824	0.110	1.216	0.093	1.875	0.414
13770	3.825	1.056	-0.219	1.934	0.220	1.385	0.262	1.630	0.169
14070	3.908	1.132	-0.143	1.900	0.186	1.376	0.253	1.714	0.253
14370	3.992	1.081	-0.194	1.875	0.161	1.334	0.211	1.697	0.236
14670	4.075	1.419	0.144	2.145	0.431	1.630	0.507	2.196	0.735
14970	4.158	1.182	-0.093	1.925	0.211	1.503	0.380	1.883	0.422
15270	4.242	0.828	-0.447	1.714	0.000	1.064	-0.059	1.334	-0.127
15570	4.325	1.106	-0.169	1.875	0.161	1.267	0.144	1.841	0.380
15870	4.408	1.098	-0.177	1.883	0.169	1.343	0.220	1.993	0.532
16170	4.492	1.081	-0.194	1.824	0.110	1.292	0.169	1.655	0.194
16470	4.575	1.191	-0.084	2.001	0.287	1.790	0.667	1.976	0.515
16770	4.658	1.165	-0.110	1.731	0.017	1.334	0.211	1.799	0.338
17070	4.742	1.047	-0.228	1.892	0.178	1.655	0.532	1.866	0.405
17370	4.825	1.165	-0.110	1.959	0.245	1.216	0.093	1.697	0.236
17670	4.908	1.056	-0.219	1.807	0.093	1.165	0.042	1.647	0.186
17970	4.992	0.861	-0.414	1.849	0.135	1.140	0.017	1.655	0.194
18270	5.075	1.039	-0.236	1.875	0.161	1.571	0.448	1.833	0.371
18570	5.158	1.250	-0.025	1.951	0.237	1.402	0.279	1.765	0.304
18870	5.242	1.081	-0.194	1.883	0.169	1.393	0.270	1.841	0.380

Table H.4 180 CFM Air Pressure Data (Test VES-4)

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
19170	5.325	1.208	-0.067	1.799	0.085	1.267	0.144	1.765	0.304
19470	5.408	1.317	0.042	1.993	0.279	2.077	0.954	2.027	0.566
19770	5.492	1.250	-0.025	2.035	0.321	2.069	0.946	2.052	0.591
20070	5.575	1.081	-0.194	1.866	0.152	1.376	0.253	1.697	0.236
20370	5.658	1.360	0.085	1.892	0.178	1.512	0.389	1.833	0.371
20670	5.742	1.360	0.085	1.723	0.009	0.490	-0.633	1.554	0.093
20970	5.825	1.444	0.169	1.790	0.076	0.996	-0.127	1.343	-0.118
21270	5.908	1.680	0.405	2.238	0.524	1.925	0.802	2.229	0.768
21570	5.992	1.588	0.313	2.001	0.287	1.520	0.397	1.714	0.253
21870	6.075	1.647	0.372	2.128	0.414	1.790	0.667	1.917	0.456
22170	6.158	1.554	0.279	2.010	0.296	1.503	0.380	1.782	0.321
22470	6.242	1.503	0.228	2.052	0.338	1.419	0.296	1.689	0.228
22770	6.325	1.740	0.465	2.077	0.363	1.267	0.144	1.917	0.456
23070	6.408	1.630	0.355	2.027	0.313	1.545	0.422	1.765	0.304

VES4COR.WQ2

Table H.3 180 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
0	0.00	1.4778	0	1.8747	0	1.2329	0	1.7987	0
30	0.01	1.5031	0.0253	1.8325	-0.0422	1.216	-0.0169	1.7902	-0.0085
60	0.02	1.5116	0.0338	1.8578	-0.0169	1.2076	-0.0253	1.7649	-0.0338
90	0.03	1.52	0.0422	1.8831	0.0084	1.2244	-0.0085	1.7987	0
120	0.03	1.3764	-0.1014	1.8831	0.0084	1.2582	0.0253	1.7902	-0.0085
150	0.04	1.2329	-0.2449	1.8662	-0.0085	1.2582	0.0253	1.7902	-0.0085
180	0.05	1.1653	-0.3125	1.7987	-0.076	1.2244	-0.0085	1.7818	-0.0169
210	0.06	1.1231	-0.3547	1.7987	-0.076	1.2076	-0.0253	1.7565	-0.0422
240	0.07	1.0387	-0.4391	1.7311	-0.1436	1.1653	-0.0676	1.7311	-0.0676
270	0.08	1.0387	-0.4391	1.7649	-0.1098	1.1822	-0.0507	1.7142	-0.0845
300	0.08	1.0471	-0.4307	1.7396	-0.1351	1.14	-0.0929	1.7396	-0.0591
330	0.09	0.97111	-0.50669	1.672	-0.2027	1.1231	-0.1098	1.7311	-0.0676
360	0.10	0.96267	-0.51513	1.7142	-0.1605	1.14	-0.0929	1.7142	-0.0845
390	0.11	0.92889	-0.54891	1.6973	-0.1774	1.1653	-0.0676	1.7396	-0.0591
420	0.12	0.89511	-0.58269	1.6973	-0.1774	1.0978	-0.1351	1.7142	-0.0845
450	0.13	0.88667	-0.59113	1.672	-0.2027	1.0809	-0.152	1.6889	-0.1098
480	0.13	0.89511	-0.58269	1.672	-0.2027	1.0893	-0.1436	1.6973	-0.1014
510	0.14	0.912	-0.5658	1.6551	-0.2196	1.0809	-0.152	1.6889	-0.1098
540	0.15	0.93734	-0.54046	1.6298	-0.2449	1.0893	-0.1436	1.7142	-0.0845
570	0.16	0.92889	-0.54891	1.6298	-0.2449	1.1062	-0.1267	1.7142	-0.0845
600	0.17	0.95423	-0.52357	1.672	-0.2027	1.0978	-0.1351	1.7396	-0.0591
630	0.18	0.92889	-0.54891	1.672	-0.2027	1.1316	-0.1013	1.7311	-0.0676
660	0.18	0.92889	-0.54891	1.672	-0.2027	1.1316	-0.1013	1.7565	-0.0422
690	0.19	1.0133	-0.4645	1.6467	-0.228	1.1231	-0.1098	1.7311	-0.0676
720	0.20	1.0049	-0.4729	1.6804	-0.1943	1.1653	-0.0676	1.7142	-0.0845
750	0.21	0.92889	-0.54891	1.672	-0.2027	1.14	-0.0929	1.6889	-0.1098
780	0.22	0.93734	-0.54046	1.6889	-0.1858	1.14	-0.0929	1.7142	-0.0845
810	0.23	0.912	-0.5658	1.6804	-0.1943	1.14	-0.0929	1.672	-0.1267
840	0.23	0.95423	-0.52357	1.6551	-0.2196	1.1484	-0.0845	1.6804	-0.1183
870	0.24	1.0218	-0.456	1.6551	-0.2196	1.1231	-0.1098	1.6804	-0.1183
900	0.25	1.0387	-0.4391	1.6382	-0.2365	1.1316	-0.1013	1.6889	-0.1098
930	0.26	0.99645	-0.48135	1.6298	-0.2449	1.1231	-0.1098	1.672	-0.1267
960	0.27	1.0387	-0.4391	1.6298	-0.2449	1.0978	-0.1351	1.6804	-0.1183
990	0.28	1.0049	-0.4729	1.672	-0.2027	1.0978	-0.1351	1.672	-0.1267

Table H.3 180 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
1020	0.28	0.97956	-0.49824	1.6044	-0.2703	1.0809	-0.152	1.6467	-0.152
1050	0.29	0.99645	-0.48135	1.6298	-0.2449	1.0978	-0.1351	1.6804	-0.1183
1080	0.30	0.97111	-0.50669	1.6298	-0.2449	1.1062	-0.1267	1.6804	-0.1183
1110	0.31	0.99645	-0.48135	1.6298	-0.2449	1.1062	-0.1267	1.6467	-0.152
1140	0.32	0.99645	-0.48135	1.6551	-0.2196	1.0978	-0.1351	1.6973	-0.1014
1170	0.33	1.0049	-0.4729	1.672	-0.2027	1.0893	-0.1436	1.672	-0.1267
1200	0.33	0.97956	-0.49824	1.6298	-0.2449	1.0893	-0.1436	1.6551	-0.1436
1230	0.34	0.95423	-0.52357	1.6044	-0.2703	1.0556	-0.1773	1.6298	-0.1689
1260	0.35	0.95423	-0.52357	1.6551	-0.2196	1.0893	-0.1436	1.6804	-0.1183
1290	0.36	0.95423	-0.52357	1.6467	-0.228	1.0809	-0.152	1.672	-0.1267
1320	0.37	0.88667	-0.59113	1.6298	-0.2449	1.0809	-0.152	1.672	-0.1267
1350	0.38	0.912	-0.5658	1.6382	-0.2365	1.0556	-0.1773	1.6551	-0.1436
1380	0.38	0.912	-0.5658	1.6298	-0.2449	1.0809	-0.152	1.6467	-0.152
1410	0.39	0.912	-0.5658	1.6129	-0.2618	1.064	-0.1689	1.6551	-0.1436
1440	0.40	0.912	-0.5658	1.6129	-0.2618	1.0556	-0.1773	1.6551	-0.1436
1470	0.41	0.88667	-0.59113	1.6129	-0.2618	1.064	-0.1689	1.672	-0.1267
1500	0.42	0.912	-0.5658	1.672	-0.2027	1.0809	-0.152	1.672	-0.1267
1530	0.43	0.912	-0.5658	1.6298	-0.2449	1.0556	-0.1773	1.6298	-0.1689
1560	0.43	0.92045	-0.55735	1.6382	-0.2365	1.0809	-0.152	1.6551	-0.1436
1590	0.44	0.95423	-0.52357	1.6551	-0.2196	1.0809	-0.152	1.672	-0.1267
1620	0.45	0.92889	-0.54891	1.6551	-0.2196	1.0809	-0.152	1.672	-0.1267
1650	0.46	0.912	-0.5658	1.6298	-0.2449	1.0556	-0.1773	1.6551	-0.1436
1680	0.47	0.912	-0.5658	1.6298	-0.2449	1.0556	-0.1773	1.6298	-0.1689
1710	0.48	0.95423	-0.52357	1.672	-0.2027	1.0893	-0.1436	1.6551	-0.1436
1740	0.48	0.96267	-0.51513	1.6467	-0.228	1.0809	-0.152	1.6467	-0.152
1770	0.49	0.92889	-0.54891	1.6382	-0.2365	1.0893	-0.1436	1.6298	-0.1689
1800	0.50	0.99645	-0.48135	1.6467	-0.228	1.0978	-0.1351	1.6467	-0.152
1830	0.51	0.97111	-0.50669	1.6298	-0.2449	1.0809	-0.152	1.6467	-0.152
1860	0.52	0.97111	-0.50669	1.6298	-0.2449	1.0809	-0.152	1.7142	-0.0845
1890	0.53	0.97111	-0.50669	1.6467	-0.228	1.0809	-0.152	1.7142	-0.0845
1920	0.53	0.97956	-0.49824	1.6551	-0.2196	1.0809	-0.152	1.7311	-0.0676
1950	0.54	0.97111	-0.50669	1.6467	-0.228	1.0893	-0.1436	1.7396	-0.0591
1980	0.55	0.97956	-0.49824	1.672	-0.2027	1.1062	-0.1267	1.7142	-0.0845
2010	0.56	0.96267	-0.51513	1.6551	-0.2196	1.0978	-0.1351	1.7142	-0.0845

Table H.3 180 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
2040	0.57	0.97111	-0.50669	1.6298	-0.2449	1.0809	-0.152	1.7311	-0.0676
2070	0.58	0.95423	-0.52357	1.6298	-0.2449	1.0809	-0.152	1.7227	-0.076
2100	0.58	0.96267	-0.51513	1.6129	-0.2618	1.0556	-0.1773	1.6889	-0.1098
2130	0.59	0.99645	-0.48135	1.6298	-0.2449	1.0809	-0.152	1.7396	-0.0591
2160	0.60	0.95423	-0.52357	1.6298	-0.2449	1.0809	-0.152	1.7227	-0.076
2190	0.61	0.95423	-0.52357	1.6298	-0.2449	1.0556	-0.1773	1.7142	-0.0845
2220	0.62	0.95423	-0.52357	1.6382	-0.2365	1.0809	-0.152	1.7227	-0.076
2250	0.63	0.95423	-0.52357	1.6551	-0.2196	1.0556	-0.1773	1.7142	-0.0845
2280	0.63	0.97956	-0.49824	1.6382	-0.2365	1.0809	-0.152	1.7142	-0.0845
2310	0.64	0.99645	-0.48135	1.6467	-0.228	1.0978	-0.1351	1.7142	-0.0845
2340	0.65	0.97111	-0.50669	1.6044	-0.2703	1.0893	-0.1436	1.7142	-0.0845
2370	0.66	0.97111	-0.50669	1.5876	-0.2871	1.064	-0.1689	1.7142	-0.0845
2400	0.67	1.0049	-0.4729	1.596	-0.2787	1.0556	-0.1773	1.7396	-0.0591
2430	0.68	1.0049	-0.4729	1.5876	-0.2871	1.0809	-0.152	1.7396	-0.0591
2460	0.68	0.97956	-0.49824	1.596	-0.2787	1.064	-0.1689	1.7142	-0.0845
2490	0.69	0.96267	-0.51513	1.6044	-0.2703	1.0893	-0.1436	1.6889	-0.1098
2520	0.70	0.97111	-0.50669	1.6129	-0.2618	1.0809	-0.152	1.7142	-0.0845
2550	0.71	0.92889	-0.54891	1.6298	-0.2449	1.0893	-0.1436	1.7227	-0.076
2580	0.72	0.912	-0.5658	1.6551	-0.2196	1.0809	-0.152	1.6889	-0.1098
2610	0.73	0.912	-0.5658	1.6298	-0.2449	1.0809	-0.152	1.6889	-0.1098
2640	0.73	0.88667	-0.59113	1.6298	-0.2449	1.0556	-0.1773	1.6889	-0.1098
2670	0.74	0.86978	-0.60802	1.5876	-0.2871	1.064	-0.1689	1.672	-0.1267
2700	0.75	0.92045	-0.55735	1.6129	-0.2618	1.064	-0.1689	1.6804	-0.1183
2730	0.76	0.912	-0.5658	1.6298	-0.2449	1.0809	-0.152	1.7142	-0.0845
2760	0.77	0.92045	-0.55735	1.6298	-0.2449	1.0809	-0.152	1.7227	-0.076
2790	0.78	0.92045	-0.55735	1.6129	-0.2618	1.0556	-0.1773	1.7142	-0.0845
2820	0.78	0.92045	-0.55735	1.672	-0.2027	1.0893	-0.1436	1.7142	-0.0845
2850	0.79	0.95423	-0.52357	1.6551	-0.2196	1.0809	-0.152	1.7227	-0.076
2880	0.80	0.95423	-0.52357	1.672	-0.2027	1.1062	-0.1267	1.6382	-0.1605
2910	0.81	0.97111	-0.50669	1.6467	-0.228	1.0809	-0.152	1.6298	-0.1689
2940	0.82	0.97111	-0.50669	1.596	-0.2787	1.0556	-0.1773	1.596	-0.2027
2970	0.83	1.0049	-0.4729	1.6129	-0.2618	1.0809	-0.152	1.6044	-0.1943
3000	0.83	0.99645	-0.48135	1.6382	-0.2365	1.0893	-0.1436	1.6298	-0.1689
3030	0.84	0.97956	-0.49824	1.6804	-0.1943	1.0809	-0.152	1.6129	-0.1858

Table H.3 180 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
3060	0.85	0.97956	-0.49824	1.6804	-0.1943	1.0809	-0.152	1.6129	-0.1858
3090	0.86	0.95423	-0.52357	1.6382	-0.2365	1.0809	-0.152	1.6044	-0.1943
3120	0.87	0.95423	-0.52357	1.6382	-0.2365	1.0556	-0.1773	1.6298	-0.1689
3150	0.88	0.97111	-0.50669	1.6382	-0.2365	1.0556	-0.1773	1.6467	-0.152
3180	0.88	0.97111	-0.50669	1.6551	-0.2196	1.0809	-0.152	1.6467	-0.152
3210	0.89	0.99645	-0.48135	1.6551	-0.2196	1.0809	-0.152	1.672	-0.1267
3240	0.90	0.95423	-0.52357	1.6129	-0.2618	1.0556	-0.1773	1.6044	-0.1943
3270	0.91	0.96267	-0.51513	1.6298	-0.2449	1.0556	-0.1773	1.6298	-0.1689
3300	0.92	0.95423	-0.52357	1.6551	-0.2196	1.0556	-0.1773	1.6129	-0.1858
3330	0.93	0.95423	-0.52357	1.672	-0.2027	1.0556	-0.1773	1.5876	-0.2111
3360	0.93	0.95423	-0.52357	1.6467	-0.228	1.0556	-0.1773	1.5876	-0.2111
3390	0.94	0.96267	-0.51513	1.6298	-0.2449	1.0556	-0.1773	1.5876	-0.2111
3420	0.95	0.92889	-0.54891	1.6382	-0.2365	1.064	-0.1689	1.596	-0.2027
3450	0.96	0.93734	-0.54046	1.596	-0.2787	1.0471	-0.1858	1.6129	-0.1858
3480	0.97	0.912	-0.5658	1.6129	-0.2618	1.0387	-0.1942	1.6129	-0.1858
3510	0.98	0.95423	-0.52357	1.6382	-0.2365	1.0387	-0.1942	1.6382	-0.1605
3540	0.98	0.95423	-0.52357	1.6298	-0.2449	1.0556	-0.1773	1.6044	-0.1943
3570	0.99	0.93734	-0.54046	1.6382	-0.2365	1.0556	-0.1773	1.6044	-0.1943
3870	1.08	0.97956	-0.49824	1.6044	-0.2703	1.0809	-0.152	1.6382	-0.1605
4170	1.16	0.93734	-0.54046	1.6298	-0.2449	1.0809	-0.152	1.6298	-0.1689
4470	1.24	0.836	-0.6418	1.672	-0.2027	1.1653	-0.0676	1.5453	-0.2534
4770	1.33	0.85289	-0.62491	1.6382	-0.2365	1.1062	-0.1267	1.52	-0.2787
5070	1.41	0.86978	-0.60802	1.6298	-0.2449	1.1231	-0.1098	1.52	-0.2787
5370	1.49	0.89511	-0.58269	1.4778	-0.3969	1.0809	-0.152	1.5876	-0.2111
5670	1.58	1.0049	-0.4729	1.596	-0.2787	1.064	-0.1689	1.5284	-0.2703
5970	1.66	0.95423	-0.52357	1.596	-0.2787	1.0556	-0.1773	1.596	-0.2027
6270	1.74	0.89511	-0.58269	1.6889	-0.1858	1.2498	0.0169	1.7565	-0.0422
6570	1.83	0.95423	-0.52357	1.7142	-0.1605	1.1907	-0.0422	1.6973	-0.1014
6870	1.91	0.912	-0.5658	1.5876	-0.2871	1.1231	-0.1098	1.8071	0.0084
7170	1.99	1.0387	-0.4391	1.6551	-0.2196	1.216	-0.0169	1.5876	-0.2111
7470	2.08	0.96267	-0.51513	1.596	-0.2787	1.1738	-0.0591	1.672	-0.1267
7770	2.16	0.86978	-0.60802	1.6804	-0.1943	1.1653	-0.0676	1.672	-0.1267
8070	2.24	0.95423	-0.52357	1.6298	-0.2449	1.1653	-0.0676	1.596	-0.2027
8370	2.33	0.96267	-0.51513	1.6298	-0.2449	1.0809	-0.152	1.7396	-0.0591

Table H.3 180 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
8670	2.41	0.99645	-0.48135	1.7142	-0.1605	1.1822	-0.0507	1.5876	-0.2111
8970	2.49	0.95423	-0.52357	1.672	-0.2027	1.216	-0.0169	1.7396	-0.0591
9270	2.58	0.88667	-0.59113	1.5876	-0.2871	1.1484	-0.0845	1.5538	-0.2449
9570	2.66	0.912	-0.5658	1.6298	-0.2449	1.1231	-0.1098	1.5876	-0.2111
9870	2.74	1.0387	-0.4391	1.6551	-0.2196	1.1231	-0.1098	1.7227	-0.076
10170	2.83	1.1822	-0.2956	1.6044	-0.2703	1.0978	-0.1351	1.672	-0.1267
10470	2.91	1.0387	-0.4391	1.7987	-0.076	1.2498	0.0169	1.8409	0.0422
10770	2.99	1.1231	-0.3547	1.8916	0.0169	1.2667	0.0338	1.52	-0.2787
11070	3.08	0.89511	-0.58269	1.7902	-0.0845	1.2751	0.0422	1.672	-0.1267
11370	3.16	0.99645	-0.48135	1.7142	-0.1605	1.1907	-0.0422	1.7227	-0.076
11670	3.24	1.0218	-0.456	1.5876	-0.2871	1.0893	-0.1436	1.672	-0.1267
11970	3.33	0.912	-0.5658	1.7649	-0.1098	1.2329	0	1.6298	-0.1689
12270	3.41	1.0218	-0.456	1.6298	-0.2449	1.2498	0.0169	1.9	0.1013
12570	3.49	1.0387	-0.4391	1.9845	0.1098	1.2751	0.0422	1.7565	-0.0422
12870	3.58	1.1653	-0.3125	1.9591	0.0844	1.2667	0.0338	1.8071	0.0084
13170	3.66	0.99645	-0.48135	1.8578	-0.0169	1.2076	-0.0253	1.8662	0.0675
13470	3.74	1.0809	-0.3969	1.7649	-0.1098	1.2244	-0.0085	1.52	-0.2787
13770	3.83	1.064	-0.4138	1.7987	-0.076	1.1822	-0.0507	1.6298	-0.1689
14070	3.91	1.0978	-0.38	1.8071	-0.0676	1.2329	0	1.596	-0.2027
14370	3.99	1.0387	-0.4391	1.672	-0.2027	1.1231	-0.1098	1.8578	0.0591
14670	4.08	1.0809	-0.3969	1.7902	-0.0845	1.2498	0.0169	1.6467	-0.152
14970	4.16	0.92889	-0.54891	1.6889	-0.1858	1.0978	-0.1351	1.8662	0.0675
15270	4.24	1.1738	-0.304	1.7142	-0.1605	1.1738	-0.0591	1.8916	0.0929
15570	4.33	1.0133	-0.4645	1.9085	0.0338	1.1822	-0.0507	1.7311	-0.0676
15870	4.41	1.1316	-0.3462	1.6804	-0.1943	1.2244	-0.0085	1.7396	-0.0591
16170	4.49	1.064	-0.4138	1.6467	-0.228	1.14	-0.0929	1.9	0.1013
16470	4.58	0.96267	-0.51513	1.7987	-0.076	1.292	0.0591	1.7565	-0.0422
16770	4.66	1.1062	-0.3716	1.7396	-0.1351	1.2076	-0.0253	2.0436	0.2449
17070	4.74	1.0809	-0.3969	2.0013	0.1266	1.3933	0.1604	1.8071	0.0084
17370	4.83	1.0218	-0.456	1.9085	0.0338	1.2076	-0.0253	1.8831	0.0844
17670	4.91	1.1738	-0.304	1.8831	0.0084	1.3427	0.1098	1.8156	0.0169
17970	4.99	1.1484	-0.3294	2.0351	0.1604	1.3764	0.1435	2.0098	0.2111
18270	5.08	1.1484	-0.3294	1.9085	0.0338	1.2498	0.0169	1.7396	-0.0591
18570	5.16	1.064	-0.4138	1.7396	-0.1351	1.1484	-0.0845	1.824	0.0253

Table H.3 180 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
18870	5.24	1.2582	-0.2196	1.9422	0.0675	1.3511	0.1182	1.7565	-0.0422
19170	5.33	1.2667	-0.2111	1.8409	-0.0338	1.1907	-0.0422	1.7311	-0.0676
19470	5.41	1.0809	-0.3969	1.7565	-0.1182	1.0218	-0.2111	1.7142	-0.0845
19770	5.49	1.0809	-0.3969	1.6804	-0.1943	1.1822	-0.0507	1.7142	-0.0845
20070	5.58	1.0809	-0.3969	1.8409	-0.0338	1.3342	0.1013	1.6973	-0.1014
20370	5.66	1.1062	-0.3716	1.7396	-0.1351	1.1653	-0.0676	1.8831	0.0844
20670	5.74	1.1062	-0.3716	1.8071	-0.0676	1.4356	0.2027	1.7902	-0.0085
20970	5.83	0.97956	-0.49824	1.6973	-0.1774	0.99645	-0.23645	1.8747	0.076
21270	5.91	1.0809	-0.3969	1.7649	-0.1098	1.2076	-0.0253	1.6129	-0.1858
21570	5.99	1.0556	-0.4222	1.7142	-0.1605	1.3596	0.1267	1.7142	-0.0845
21870	6.08	1.0893	-0.3885	1.7649	-0.1098	1.1653	-0.0676	1.6467	-0.152
22170	6.16	0.99645	-0.48135	1.6889	-0.1858	1.2076	-0.0253	1.672	-0.1267
22470	6.24	1.064	-0.4138	1.7396	-0.1351	1.2244	-0.0085	1.7818	-0.0169
22770	6.33	1.1316	-0.3462	1.8493	-0.0254	1.2751	0.0422	1.7142	-0.0845
23070	6.41	1.0893	-0.3885	1.8493	-0.0254	1.444	0.2111	1.7142	-0.0845
23370	6.49	1.1062	-0.3716	1.7987	-0.076	1.3849	0.152	1.6298	-0.1689
23670	6.58	1.0809	-0.3969	1.8071	-0.0676	1.3342	0.1013	1.7649	-0.0338
23970	6.66	1.064	-0.4138	1.7396	-0.1351	1.3511	0.1182	1.7902	-0.0085
24270	6.74	1.064	-0.4138	1.7396	-0.1351	1.3173	0.0844	1.7311	-0.0676
24570	6.83	1.0133	-0.4645	1.7142	-0.1605	1.2498	0.0169	1.6804	-0.1183
24870	6.91	1.0471	-0.4307	1.7565	-0.1182	1.2498	0.0169	1.672	-0.1267
25170	6.99	0.97111	-0.50669	1.7227	-0.152	1.2076	-0.0253	1.7142	-0.0845
25470	7.08	1.0471	-0.4307	1.7649	-0.1098	1.3004	0.0675	1.7649	-0.0338
25770	7.16	1.0387	-0.4391	1.7565	-0.1182	1.3933	0.1604	1.6467	-0.152
26070	7.24	0.96267	-0.51513	1.7565	-0.1182	1.3004	0.0675	1.6467	-0.152
26370	7.33	1.0387	-0.4391	1.7311	-0.1436	1.3933	0.1604	1.672	-0.1267
26670	7.41	1.0556	-0.4222	1.7565	-0.1182	1.3427	0.1098	1.6467	-0.152
26970	7.49	1.0387	-0.4391	1.7142	-0.1605	1.2751	0.0422	1.7396	-0.0591
27270	7.58	1.064	-0.4138	1.7396	-0.1351	1.3004	0.0675	1.7396	-0.0591
27570	7.66	1.0133	-0.4645	1.7142	-0.1605	1.3089	0.076	1.7902	-0.0085
27870	7.74	1.0809	-0.3969	1.7649	-0.1098	1.292	0.0591	1.7565	-0.0422
28170	7.83	1.0387	-0.4391	1.7396	-0.1351	1.3173	0.0844	1.6973	-0.1014
28470	7.91	1.0218	-0.456	1.7227	-0.152	1.2498	0.0169	1.5876	-0.2111
28770	7.99	1.4862	0.0084	1.9253	0.0506	1.3342	0.1013	1.7396	-0.0591

Table H.3 180 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17 DATA	WT-17 Corrected	WT-13 DATA	WT-13 Corrected	OW-1 DATA	OW-1 Corrected	OW-2 DATA	OW-2 Corrected
29070	8.08	1.5453	0.0675	1.9591	0.0844	1.3764	0.1435	1.6889	-0.1098
29370	8.16	1.5284	0.0506	1.9591	0.0844	1.3849	0.152	1.7396	-0.0591
29670	8.24	1.5453	0.0675	1.9507	0.076	1.4018	0.1689	1.7565	-0.0422
29970	8.33	1.5453	0.0675	2.0098	0.1351	1.444	0.2111	1.7987	0
30270	8.41	1.5876	0.1098	1.9845	0.1098	1.3933	0.1604	1.7565	-0.0422
30570	8.49	1.6044	0.1266	2.0013	0.1266	1.4187	0.1858	1.7565	-0.0422
30870	8.58	1.596	0.1182	2.0098	0.1351	1.4271	0.1942	1.8493	0.0506
31170	8.66	1.6044	0.1266	2.0098	0.1351	1.4609	0.228	1.8578	0.0591
31470	8.74	1.5707	0.0929	1.976	0.1013	1.4271	0.1942	1.824	0.0253
31770	8.83	1.52	0.0422	1.9169	0.0422	1.3596	0.1267	1.6889	-0.1098
32070	8.91	1.52	0.0422	1.9253	0.0506	1.3764	0.1435	1.6973	-0.1014
32370	8.99	1.5453	0.0675	1.9507	0.076	1.4018	0.1689	1.7396	-0.0591
32670	9.08	1.52	0.0422	1.9422	0.0675	1.3849	0.152	1.7227	-0.076
32970	9.16	1.5453	0.0675	1.9507	0.076	1.3764	0.1435	1.7227	-0.076
33270	9.24	1.5031	0.0253	1.9253	0.0506	1.3596	0.1267	1.6889	-0.1098
33570	9.33	1.5031	0.0253	1.9	0.0253	1.3342	0.1013	1.6804	-0.1183
33870	9.41	1.5284	0.0506	1.9169	0.0422	1.3511	0.1182	1.6889	-0.1098
34170	9.49	1.52	0.0422	1.9338	0.0591	1.3849	0.152	1.7142	-0.0845
34470	9.58	1.5284	0.0506	1.9338	0.0591	1.3764	0.1435	1.6889	-0.1098
34770	9.66	1.5116	0.0338	1.9085	0.0338	1.3596	0.1267	1.6973	-0.1014
35070	9.74	1.5284	0.0506	1.9253	0.0506	1.3849	0.152	1.7142	-0.0845
35370	9.83	1.5031	0.0253	1.9253	0.0506	1.3764	0.1435	1.6889	-0.1098
35670	9.91	1.5116	0.0338	1.9169	0.0422	1.3511	0.1182	1.6973	-0.1014
35970	9.99	1.5031	0.0253	1.9169	0.0422	1.3764	0.1435	1.7142	-0.0845
36270	10.08	1.5031	0.0253	1.9085	0.0338	1.3342	0.1013	1.6804	-0.1183
36570	10.16	1.4778	0	1.9	0.0253	1.3427	0.1098	1.6804	-0.1183
36870	10.24	1.4693	-0.0085	1.8662	-0.0085	1.3173	0.0844	1.6551	-0.1436
37170	10.33	1.4609	-0.0169	1.8831	0.0084	1.3089	0.076	1.6551	-0.1436
37470	10.41	1.4693	-0.0085	1.8747	0	1.292	0.0591	1.6298	-0.1689
37770	10.49	1.4693	-0.0085	1.8747	0	1.3173	0.0844	1.6551	-0.1436
38070	10.58	1.4609	-0.0169	1.8831	0.0084	1.3173	0.0844	1.6551	-0.1436
38370	10.66	1.4693	-0.0085	1.8747	0	1.292	0.0591	1.6298	-0.1689
38670	10.74	1.4609	-0.0169	1.8747	0	1.3173	0.0844	1.6551	-0.1436
38970	10.83	1.4609	-0.0169	1.8662	-0.0085	1.3173	0.0844	1.6551	-0.1436

Table H.3 180 CFM Air Pressure Data

Time(sec)	Time(hr)	WT-17	WT-17	WT-13	WT-13	OW-1	OW-1	OW-2	OW-2
		DATA	Corrected	DATA	Corrected	DATA	Corrected	DATA	Corrected
39270	10.91	1.444	-0.0338	1.8578	-0.0169	1.3004	0.0675	1.6298	-0.1689
39570	10.99	1.4356	-0.0422	1.8578	-0.0169	1.3004	0.0675	1.6298	-0.1689

VES3COR.WQ2

Table H.5 Extraction Vacuum in PR-1

Time (sec)	Time(hr)	VES-1		VES-2		VES-3		VES-4	
		PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected
0	0.00	1.647	0.000	1.8493	0	1.8662	0	1.909	-0.000
30	0.01	1.782	0.135	1.8493	0	1.8662	0	1.917	0.008
60	0.02	1.714	0.067	1.8071	-0.0422	1.8831	0.0169	1.917	0.008
90	0.03	1.596	-0.051	1.7818	-0.0675	1.9	0.0338	-0.760	-2.669
120	0.03	1.503	-0.144	1.7818	-0.0675	-0.76845	-2.63465	-1.486	-3.395
150	0.04	-1.436	-3.082	1.8156	-0.0337	-1.3596	-3.2258	-1.545	-3.454
180	0.05	-1.621	-3.268	1.7987	-0.0506	-1.3596	-3.2258	-1.571	-3.480
210	0.06	-1.680	-3.327	1.7565	-0.0928	-1.3933	-3.2595	-1.528	-3.437
240	0.07	-1.630	-3.277	1.7565	-0.0928	-1.4102	-3.2764	-1.520	-3.429
270	0.08	-1.621	-3.268	-0.32089	-2.17019	-1.3933	-3.2595	-1.486	-3.395
300	0.08	-1.604	-3.251	-0.684	-2.5333	-1.3596	-3.2258	-1.486	-3.395
330	0.09	-1.571	-3.217	-0.76	-2.6093	-1.3596	-3.2258	-1.469	-3.378
360	0.10		-1.647	-0.532	-2.3813	-1.3596	-3.2258	-1.444	-3.353
390	0.11	-1.436	-3.082	-0.56578	-2.41508	-1.3427	-3.2089	-1.419	-3.328
420	0.12	-1.360	-3.006	-0.56578	-2.41508	-1.3342	-3.2004	-1.419	-3.328
450	0.13	-1.275	-2.922	-0.52356	-2.37286	-1.3004	-3.1666	-1.402	-3.311
480	0.13	-1.250	-2.897	-0.54889	-2.39819	-1.3089	-3.1751	-1.385	-3.294
510	0.14	-0.988	-2.635	-0.52356	-2.37286	-1.2667	-3.1329	-1.495	-3.404
540	0.15	0.363	-1.284	-0.50667	-2.35597	-1.2751	-3.1413	-1.495	-3.404
570	0.16	0.532	-1.115	-0.48133	-2.33063	-1.2582	-3.1244	-1.486	-3.395
600	0.17	0.616	-1.030	-0.47289	-2.32219	-1.2329	-3.0991	-1.503	-3.412
630	0.18	0.659	-0.988	-0.43067	-2.27997	-1.2498	-3.116	-1.478	-3.387
660	0.18	0.684	-0.963	-0.43911	-2.28841	-1.2329	-3.0991	-1.478	-3.387
690	0.19	0.735	-0.912	-0.39689	-2.24619	-1.216	-3.0822	-1.503	-3.412
720	0.20	0.701	-0.946	-0.38845	-2.23775	-1.1991	-3.0653	-1.461	-3.370
750	0.21	0.794	-0.853	-0.43911	-2.28841	-1.2667	-3.1329	-1.486	-3.395
780	0.22	0.743	-0.904	-0.42222	-2.27152	-1.2498	-3.116	-1.478	-3.387
810	0.23	0.828	-0.819	-0.39689	-2.24619	-1.2413	-3.1075	-1.495	-3.404
840	0.23	0.709	-0.937	-0.40533	-2.25463	-1.2076	-3.0738	-1.478	-3.387
870	0.24	0.895	-0.752	-0.44756	-2.29686	-1.2667	-3.1329	-1.528	-3.437
900	0.25	0.785	-0.861	-0.43911	-2.28841	-1.2582	-3.1244	-1.512	-3.421
930	0.26	0.878	-0.768	-0.42222	-2.27152	-1.2582	-3.1244	-1.528	-3.437
960	0.27	0.963	-0.684	-0.39689	-2.24619	-1.2582	-3.1244	-1.520	-3.429

Table H.5 Extraction Vacuum in PR-1

Time (sec)	Time(hr)	VES-1	PR-1	VES-2	PR-1	VES-3	PR-1	VES-4	PR-1
		DATA	Corrected	DATA	Corrected	DATA	Corrected	DATA	Corrected
990	0.28	0.828	-0.819	-0.43911	-2.28841	-1.3004	-3.1666	-1.537	-3.446
1020	0.28	0.828	-0.819	-0.38845	-2.23775	-1.3089	-3.1751	-1.537	-3.446
1050	0.29	0.895	-0.752	-0.39689	-2.24619	-1.3173	-3.1835	-1.545	-3.454
1080	0.30	0.828	-0.819	-0.40533	-2.25463	-1.3258	-3.192	-1.528	-3.437
1110	0.31	0.861	-0.785	-0.38845	-2.23775	-1.2582	-3.1244	-1.520	-3.429
1140	0.32	0.963	-0.684	-0.43911	-2.28841	-1.2498	-3.116	-1.520	-3.429
1170	0.33	0.777	-0.870	-0.40533	-2.25463	-1.292	-3.1582	-1.486	-3.395
1200	0.33	0.828	-0.819	-0.43911	-2.28841	-1.3089	-3.1751	-1.486	-3.395
1230	0.34	0.743	-0.904	-0.39689	-2.24619	-1.3089	-3.1751	-1.334	-3.243
1260	0.35	0.870	-0.777	-0.36311	-2.21241	-1.2582	-3.1244	-1.427	-3.336
1290	0.36	0.878	-0.768	-0.34622	-2.19552	-1.2076	-3.0738	-1.393	-3.302
1320	0.37	0.828	-0.819	-0.43911	-2.28841	-1.292	-3.1582	-1.402	-3.311
1350	0.38	1.013	-0.633	-0.43067	-2.27997	-1.2498	-3.116	-1.351	-3.260
1380	0.38	0.996	-0.650	-0.42222	-2.27152	-1.2076	-3.0738	-1.393	-3.302
1410	0.39	0.963	-0.684	-0.43911	-2.28841	-1.1991	-3.0653	-1.376	-3.285
1440	0.40	0.861	-0.785	-0.43911	-2.28841	-1.1316	-2.9978	-1.351	-3.260
1470	0.41	0.954	-0.692	-0.43911	-2.28841	-1.1569	-3.0231	-1.351	-3.260
1500	0.42	0.963	-0.684	-0.39689	-2.24619	-1.0893	-2.9555	-1.334	-3.243
1530	0.43	0.954	-0.692	-0.39689	-2.24619	-1.1231	-2.9893	-1.368	-3.277
1560	0.43	0.996	-0.650	-0.34622	-2.19552	-1.0978	-2.964	-1.284	-3.193
1590	0.44	0.819	-0.828	-0.34622	-2.19552	-1.0978	-2.964	-1.292	-3.201
1620	0.45	0.870	-0.777	-0.19422	-2.04352	-1.0218	-2.888	-1.250	-3.159
1650	0.46	0.912	-0.735	-0.25333	-2.10263	-1.0724	-2.9386	-1.233	-3.142
1680	0.47	0.887	-0.760	-0.25333	-2.10263	-1.0471	-2.9133	-1.224	-3.133
1710	0.48	0.878	-0.768	-0.27022	-2.11952	-1.0471	-2.9133	-1.106	-3.015
1740	0.48	1.005	-0.642	-0.31245	-2.16175	-1.0302	-2.8964	-1.148	-3.057
1770	0.49	1.106	-0.541	-0.34622	-2.19552	-1.0218	-2.888	-1.115	-3.024
1800	0.50	0.954	-0.692	-0.31245	-2.16175	-0.988	-2.8542	-1.132	-3.041
1830	0.51	1.064	-0.583	-0.21956	-2.06886	-0.99645	-2.86265	-1.165	-3.074
1860	0.52	0.963	-0.684	-0.228	-2.0773	-0.99645	-2.86265	-1.140	-3.049
1890	0.53	0.937	-0.709	-0.26178	-2.11108	-0.988	-2.8542	-1.165	-3.074
1920	0.53	1.022	-0.625	-0.27022	-2.11952	-0.97956	-2.84576	-1.148	-3.057
1950	0.54	0.954	-0.692	-0.31245	-2.16175	-0.99645	-2.86265	-1.157	-3.066

Table H.5 Extraction Vacuum in PR-1

Time (sec)	Time(hr)	VES-1	PR-1	VES-2	PR-1	VES-3	PR-1	VES-4	PR-1
		DATA	Corrected	DATA	Corrected	DATA	Corrected	DATA	Corrected
1980	0.55	1.064	-0.583	-0.21111	-2.06041	-0.97111	-2.83731	-1.182	-3.091
2010	0.56	0.996	-0.650	-0.228	-2.0773	-1.0133	-2.8795	-1.199	-3.108
2040	0.57	0.912	-0.735	-0.17733	-2.02663	-1.0049	-2.8711	-1.216	-3.125
2070	0.58	1.081	-0.566	-0.09289	-1.94219	-1.0387	-2.9049	-1.191	-3.100
2100	0.58	0.954	-0.692	-0.08445	-1.93375	-1.0302	-2.8964	-1.208	-3.117
2130	0.59	1.191	-0.456	-0.19422	-2.04352	-0.988	-2.8542	-1.224	-3.133
2160	0.60	0.963	-0.684	-0.228	-2.0773	-1.0471	-2.9133	-1.191	-3.100
2190	0.61	0.954	-0.692	-0.21956	-2.06886	-1.0387	-2.9049	-1.199	-3.108
2220	0.62	1.013	-0.633	-0.25333	-2.10263	-1.0471	-2.9133	-1.216	-3.125
2250	0.63	0.996	-0.650	-0.18578	-2.03508	-1.0724	-2.9386	-1.199	-3.108
2280	0.63	1.106	-0.541	0.016889	-1.83241	-1.0471	-2.9133	-1.199	-3.108
2310	0.64	1.013	-0.633	-0.06756	-1.91686	-1.0302	-2.8964	-1.199	-3.108
2340	0.65	0.954	-0.692	-0.16889	-2.01819	-1.0893	-2.9555	-1.224	-3.133
2370	0.66	0.963	-0.684	-0.18578	-2.03508	-1.0556	-2.9218	-1.208	-3.117
2400	0.67	1.140	-0.507	-0.10133	-1.95063	-1.0387	-2.9049	-1.182	-3.091
2430	0.68	1.081	-0.566	-0.14356	-1.99286	-1.0133	-2.8795	-1.182	-3.091
2460	0.68	1.123	-0.524	-0.18578	-2.03508	-1.0387	-2.9049	-1.199	-3.108
2490	0.69	1.047	-0.600	-0.04222	-1.89152	-1.0387	-2.9049	-1.216	-3.125
2520	0.70	1.039	-0.608	-0.09289	-1.94219	-1.0049	-2.8711	-1.199	-3.108
2550	0.71	1.047	-0.600	-0.10133	-1.95063	-1.064	-2.9302	-1.182	-3.091
2580	0.72	1.056	-0.591	-0.10978	-1.95908	-1.0809	-2.9471	-1.208	-3.117
2610	0.73	1.165	-0.481	-0.10978	-1.95908	-1.0471	-2.9133	-1.208	-3.117
2640	0.73	1.013	-0.633	-0.13511	-1.98441	-1.1062	-2.9724	-1.216	-3.125
2670	0.74	1.123	-0.524	-0.10133	-1.95063	-1.1316	-2.9978	-1.224	-3.133
2700	0.75	1.081	-0.566	-0.00844	-1.85774	-1.14	-3.0062	-1.216	-3.125
2730	0.76	0.954	-0.692	-0.05911	-1.90841	-1.0978	-2.964	-1.208	-3.117
2760	0.77	1.081	-0.566	-0.10133	-1.95063	-1.1147	-2.9809	-1.224	-3.133
2790	0.78	1.224	-0.422	0.10133	-1.74797	-1.1231	-2.9893	-1.224	-3.133
2820	0.78	0.996	-0.650	-0.02533	-1.87463	-1.1484	-3.0146	-1.224	-3.133
2850	0.79	1.216	-0.431	-0.01689	-1.86619	-1.0978	-2.964	-1.191	-3.100
2880	0.80	1.174	-0.473	-0.06756	-1.91686	-1.0724	-2.9386	-1.241	-3.150
2910	0.81	0.996	-0.650	-0.13511	-1.98441	-1.1147	-2.9809	-1.233	-3.142
2940	0.82	1.182	-0.465	-0.02533	-1.87463	-1.1738	-3.04	-1.199	-3.108

Table H.5 Extraction Vacuum in PR-1

Time (sec)	Time(hr)	VES-1		VES-2		VES-3		VES-4	
		PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected
2970	0.83	1.233	-0.414	-0.09289	-1.94219	-1.0893	-2.9555	-1.267	-3.176
3000	0.83	1.317	-0.329	-0.14356	-1.99286	-1.14	-3.0062	-1.292	-3.201
3030	0.84	1.174	-0.473	-0.10133	-1.95063	-1.14	-3.0062	-1.309	-3.218
3060	0.85	1.182	-0.465	-0.09289	-1.94219	-1.1991	-3.0653	-1.317	-3.226
3090	0.86	1.098	-0.549	-0.10133	-1.95063	-1.2076	-3.0738	-1.343	-3.252
3120	0.87	1.148	-0.498	-0.08445	-1.93375	-1.2498	-3.116	-1.326	-3.235
3150	0.88	0.912	-0.735	-0.04222	-1.89152	-1.2413	-3.1075	-1.326	-3.235
3180	0.88	0.954	-0.692	-0.00844	-1.85774	-1.1484	-3.0146	-1.326	-3.235
3210	0.89	1.132	-0.515	-0.05067	-1.89997	-1.1147	-2.9809	-1.309	-3.218
3240	0.90	1.039	-0.608	0.033778	-1.81552	-1.216	-3.0822	-1.326	-3.235
3270	0.91	1.039	-0.608	0.016889	-1.83241	-1.2413	-3.1075	-1.334	-3.243
3300	0.92	1.174	-0.473	-0.05067	-1.89997	-1.1484	-3.0146	-1.284	-3.193
3330	0.93	1.275	-0.372	-0.09289	-1.94219	-1.1569	-3.0231	-1.123	-3.032
3360	0.93	1.165	-0.481	-0.04222	-1.89152	-1.1653	-3.0315	-1.157	-3.066
3390	0.94	1.148	-0.498	-0.01689	-1.86619	-1.14	-3.0062	-1.224	-3.133
3420	0.95	1.191	-0.456	0.10133	-1.74797	-1.1653	-3.0315	-1.258	-3.167
3450	0.96	1.300	-0.346	0.025333	-1.82397	-1.1738	-3.04	-1.081	-2.990
3480	0.97	1.132	-0.515	0.033778	-1.81552	-1.1062	-2.9724	-1.140	-3.049
3510	0.98	1.022	-0.625	0.10978	-1.73952	-1.0978	-2.964	-1.208	-3.117
3540	0.98	1.106	-0.541	0.067556	-1.78174	-1.0893	-2.9555	-1.208	-3.117
3570	0.99	1.182	-0.465	0.025333	-1.82397	-1.064	-2.9302	-1.224	-3.133
3870	1.08	1.123	-0.524	0.067556	-1.78174	-1.0133	-2.8795	-0.963	-2.872
4170	1.16	1.013	-0.633	0.033778	-1.81552	-0.92889	-2.79509	-1.123	-3.032
4470	1.24	0.996	-0.650	0.016889	-1.83241	-0.90356	-2.76976	-0.996	-2.905
4770	1.33	1.081	-0.566	0.10133	-1.74797	-1.0387	-2.9049	-1.047	-2.956
5070	1.41	1.208	-0.439	0.11822	-1.73108	-1.0809	-2.9471	-1.013	-2.922
5370	1.49	1.132	-0.515	0.11822	-1.73108	-1.14	-3.0062	-0.946	-2.855
5670	1.58	1.081	-0.566	0.11822	-1.73108	-0.94578	-2.81198	-1.039	-2.948
5970	1.66	1.089	-0.557	0.20267	-1.64663	-0.97956	-2.84576	-1.064	-2.973
6270	1.74	1.064	-0.583	0.152	-1.6973	-0.95423	-2.82043	-1.013	-2.922
6570	1.83	1.081	-0.566	0.152	-1.6973	-0.92045	-2.78665	-0.963	-2.872
6870	1.91	1.013	-0.633	0.17733	-1.67197	-0.97956	-2.84576	-0.954	-2.863
7170	1.99	1.174	-0.473	0.076	-1.7733	-0.94578	-2.81198	-1.022	-2.931

Table H.5 Extraction Vacuum in PR-1

Time (sec)	Time(hr)	VES-1		VES-2		VES-3		VES-4	
		PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected
7470	2.08	0.996	-0.650	0.067556	-1.78174	-0.96267	-2.82887	-0.996	-2.905
7770	2.16	1.106	-0.541	0.050667	-1.79863	-0.99645	-2.86265	-1.056	-2.965
8070	2.24	1.047	-0.600	0.10978	-1.73952	-1.0133	-2.8795	-1.098	-3.007
8370	2.33	1.081	-0.566	-0.05911	-1.90841	-1.0218	-2.888	-1.123	-3.032
8670	2.41	1.081	-0.566	-0.04222	-1.89152	-1.0724	-2.9386	-1.157	-3.066
8970	2.49	0.996	-0.650	-0.05067	-1.89997	-1.064	-2.9302	-0.996	-2.905
9270	2.58	1.140	-0.507	0.025333	-1.82397	-1.0556	-2.9218	-1.056	-2.965
9570	2.66	1.089	-0.557	-0.14356	-1.99286	-1.0218	-2.888	-1.072	-2.981
9870	2.74	1.106	-0.541	-0.05911	-1.90841	-1.0556	-2.9218	-1.056	-2.965
10170	2.83	2.576	0.929	-0.10978	-1.95908	-0.96267	-2.82887	-1.072	-2.981
10470	2.91	2.533	0.887	-0.18578	-2.03508	-1.0387	-2.9049	-0.996	-2.905
10770	2.99	2.356	0.709	-0.10133	-1.95063	-1.0218	-2.888	-0.980	-2.889
11070	3.08	2.077	0.431	-0.16889	-2.01819	-1.0218	-2.888	-1.022	-2.931
11370	3.16	2.010	0.363	-0.10978	-1.95908	-1.064	-2.9302	-0.980	-2.889
11670	3.24	1.900	0.253	-0.14356	-1.99286	-1.064	-2.9302	-0.980	-2.889
11970	3.33	1.900	0.253	-0.05911	-1.90841	-1.0218	-2.888	-0.971	-2.880
12270	3.41	1.833	0.186	-0.02533	-1.87463	-1.0387	-2.9049	-0.996	-2.905
12570	3.49	1.833	0.186	-0.01689	-1.86619	-1.0049	-2.8711	-1.064	-2.973
12870	3.58	1.807	0.160	-0.06756	-1.91686	-1.0556	-2.9218	-1.064	-2.973
13170	3.66	1.824	0.177	-0.00844	-1.85774	-1.064	-2.9302	-0.996	-2.905
13470	3.74	1.833	0.186	-0.05911	-1.90841	-1.0218	-2.888	-0.904	-2.813
13770	3.83	1.816	0.169	-0.04222	-1.89152	-1.0302	-2.8964	-0.946	-2.855
14070	3.91	1.807	0.160	-0.02533	-1.87463	-0.99645	-2.86265	-0.853	-2.762
14370	3.99	1.807	0.160	0	-1.8493	-1.0133	-2.8795	-0.870	-2.779
14670	4.08	1.824	0.177	-0.00844	-1.85774	-1.0133	-2.8795	-0.971	-2.880
14970	4.16	1.757	0.110	0.050667	-1.79863	-1.0556	-2.9218	-1.005	-2.914
15270	4.24	1.807	0.160	0.033778	-1.81552	-0.99645	-2.86265	-0.988	-2.897
15570	4.33	1.816	0.169	0.10133	-1.74797	-1.0809	-2.9471	-0.929	-2.838
15870	4.41	1.816	0.169	-0.01689	-1.86619	-1.064	-2.9302	-0.929	-2.838
16170	4.49	1.849	0.203	0.050667	-1.79863	-1.0302	-2.8964	-0.954	-2.863
16470	4.58	1.833	0.186	0.008445	-1.84086	-0.99645	-2.86265	-0.937	-2.846
16770	4.66	1.841	0.194	0.016889	-1.83241	-1.0049	-2.8711	-0.912	-2.821
17070	4.74	1.833	0.186	-0.01689	-1.86619	-1.0218	-2.888	-0.895	-2.804

Table H.5 Extraction Vacuum in PR-1

Time (sec)	Time(hr)	VES-1	PR-1 Corrected	VES-2	PR-1 Corrected	VES-3	PR-1 Corrected	VES-4	PR-1 Corrected
		PR-1 DATA		PR-1 DATA		PR-1 DATA		PR-1 DATA	
17370	4.83	1.816	0.169	0.016889	-1.83241	-1.0471	-2.9133	-0.971	-2.880
17670	4.91	1.858	0.211	-0.01689	-1.86619	-1.0049	-2.8711	-0.988	-2.897
17970	4.99	1.824	0.177	-0.01689	-1.86619	-1.0133	-2.8795	-1.056	-2.965
18270	5.08	1.824	0.177	0.025333	-1.82397	-1.0218	-2.888	-0.971	-2.880
18570	5.16	1.816	0.169	0.025333	-1.82397	-1.0556	-2.9218	-1.047	-2.956
18870	5.24	1.790	0.143	0.033778	-1.81552	-1.0049	-2.8711	-1.089	-2.998
19170	5.33	1.833	0.186	0.050667	-1.79863	-1.0049	-2.8711	-0.929	-2.838
19470	5.41	1.875	0.228	0.025333	-1.82397	-1.0978	-2.964	-0.946	-2.855
19770	5.49	1.824	0.177	-0.01689	-1.86619	-1.064	-2.9302	-1.064	-2.973
20070	5.58	1.849	0.203	0.016889	-1.83241	-1.0809	-2.9471	2.398	0.489
20370	5.66	1.833	0.186	-0.05911	-1.90841	-1.064	-2.9302	2.466	0.557
20670	5.74	1.841	0.194	-0.00844	-1.85774	-1.1231	-2.9893	2.373	0.464
20970	5.83	1.816	0.169	-0.02533	-1.87463	-1.1653	-3.0315	2.466	0.557
21270	5.91	1.799	0.152	0	-1.8493	-1.1147	-2.9809	2.441	0.532
21570	5.99	1.849	0.203	-0.00844	-1.85774	-1.1822	-3.0484	2.398	0.489
21870	6.08	1.858	0.211	-0.01689	-1.86619	-1.0893	-2.9555	2.305	0.396
22170	6.16	1.875	0.228	-0.00844	-1.85774	-1.14	-3.0062	2.238	0.329
22470	6.24	1.866	0.220	-0.01689	-1.86619	-1.1569	-3.0231	2.280	0.371
22770	6.33	1.858	0.211	-0.04222	-1.89152	-1.1231	-2.9893	2.280	0.371
23070	6.41	1.866	0.220	-0.18578	-2.03508	-1.1316	-2.9978		
23370	6.49	1.858	0.211	-0.16889	-2.01819	-1.1231	-2.9893		
23670	6.58	1.841	0.194	-0.14356	-1.99286	-1.1738	-3.04		
23970	6.66	1.858	0.211	-0.09289	-1.94219	-1.1484	-3.0146		
24270	6.74	1.866	0.220	-0.10133	-1.95063	-1.1822	-3.0484		
24570	6.83	1.849	0.203	-0.19422	-2.04352	-1.1653	-3.0315		
24870	6.91	1.849	0.203	-0.18578	-2.03508	-1.1822	-3.0484		
25170	6.99	1.858	0.211	-0.16889	-2.01819	-1.2329	-3.0991		
25470	7.08	1.833	0.186	-0.16889	-2.01819	-1.1653	-3.0315		
25770	7.16	1.833	0.186	-0.05911	-1.90841	-1.1653	-3.0315		
26070	7.24	1.833	0.186	-0.10133	-1.95063	-1.2413	-3.1075		
26370	7.33	1.833	0.186	-0.04222	-1.89152	-1.216	-3.0822		
26670	7.41	1.824	0.177	-0.06756	-1.91686	-1.2582	-3.1244		
26970	7.49	1.824	0.177	-0.10133	-1.95063	-1.1991	-3.0653		

Table H.5 Extraction Vacuum in PR-1

Time (sec)	Time(hr)	VES-1 PR-1	PR-1	VES-2 PR-1	PR-1	VES-3 PR-1	PR-1	VES-4 PR-1	PR-1
		DATA	Corrected	DATA	Corrected	DATA	Corrected	DATA	Corrected
27270	7.58	1.833	0.186	-0.12667	-1.97597	-1.1822	-3.0484		
27570	7.66	1.824	0.177	-0.10133	-1.95063	-1.1907	-3.0569		
27870	7.74	1.833	0.186	-0.05911	-1.90841	-1.0809	-2.9471		
28170	7.83	1.833	0.186	-0.00844	-1.85774	-1.1653	-3.0315		
28470	7.91	1.824	0.177	-0.05067	-1.89997	-1.1991	-3.0653		
28770	7.99	1.841	0.194	-0.09289	-1.94219	2.3982	0.532		
29070	8.08	1.841	0.194	-0.02533	-1.87463	2.3898	0.5236		
29370	8.16	1.849	0.203	1.9422	0.0929	2.3729	0.5067		
29670	8.24	1.883	0.236	2.4405	0.5912	2.4067	0.5405		
29970	8.33	1.883	0.236	2.4236	0.5743	2.3645	0.4983		
30270	8.41	1.841	0.194	2.356	0.5067	2.2716	0.4054		
30570	8.49	1.866	0.220	2.3307	0.4814	2.2462	0.38		
30870	8.58	1.866	0.220	2.3053	0.456	2.2209	0.3547		
31170	8.66	1.849	0.203	2.2378	0.3885	2.1956	0.3294		
31470	8.74	1.841	0.194	2.2209	0.3716	2.1449	0.2787		
31770	8.83	1.841	0.194	2.1871	0.3378	2.0942	0.228		
32070	8.91	1.824	0.177	2.1533	0.304	2.0773	0.2111		
32370	8.99	1.799	0.152	2.1196	0.2703	2.0858	0.2196		
32670	9.08	1.782	0.135	2.0858	0.2365	2.0605	0.1943		
32970	9.16	1.790	0.143	2.0858	0.2365	2.0436	0.1774		
33270	9.24	1.757	0.110	2.0689	0.2196	2.0267	0.1605		
33570	9.33	1.740	0.093	2.0858	0.2365	1.9929	0.1267		
33870	9.41	1.740	0.093	2.0436	0.1943	2.0436	0.1774		
34170	9.49	1.723	0.076	2.052	0.2027	2.0351	0.1689		
34470	9.58	1.714	0.067	2.0267	0.1774	2.0267	0.1605		
34770	9.66	1.740	0.093	2.0098	0.1605	2.0098	0.1436		
35070	9.74	1.740	0.093	1.9929	0.1436	2.0182	0.152		
35370	9.83	1.714	0.067	1.976	0.1267	2.0013	0.1351		
35670	9.91	1.714	0.067	1.9591	0.1098	1.9929	0.1267		
35970	9.99	1.723	0.076	1.9507	0.1014	1.9845	0.1183		
36270	10.08	1.714	0.067	1.9507	0.1014	1.976	0.1098		
36570	10.16	1.723	0.076	1.9338	0.0845	1.9676	0.1014		
36870	10.24	1.714	0.067	1.9676	0.1183	1.9422	0.076		

Table H.5 Extraction Vacuum in PR-1

Time (sec)	Time(hr)	VES-1		VES-2		VES-3		VES-4	
		PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected	PR-1 DATA	PR-1 Corrected
37170	10.33	1.714	0.067	1.9338	0.0845	1.9507	0.0845		
37470	10.41	1.714	0.067	1.9253	0.076	1.9338	0.0676		
37770	10.49	1.714	0.067	1.9085	0.0592	1.9253	0.0591		
38070	10.58	1.723	0.076	1.9338	0.0845	1.9338	0.0676		
38370	10.66	1.714	0.067	1.9085	0.0592	1.9169	0.0507		
38670	10.74	1.689	0.042	1.8747	0.0254	1.9169	0.0507		
38970	10.83	1.723	0.076	1.8662	0.0169	1.9169	0.0507		
39270	10.91	1.723	0.076	1.8831	0.0338	1.9	0.0338		
39570	10.99	1.697	0.051	1.9169	0.0676	1.9	0.0338		

VESPR1.WQ1

APPENDIX I
SOIL VAPOR EXTRACTION PILOT STUDY
AIR SAMPLES
LABORATORY RESULTS

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES

SITE:		MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12
LOCATION:						
DEPTH:						
SAMPLE NUMBER:		AS-092893-1	AS-092893-2	AS-092993-1	AS-092993-2	AS-092993-3
LAB SAMPLE NO.:		9309255A-01A	9309255A-02A	9309255A-03A	9309255A-04A	9309255A-05A
MATRIX:		AIB	AIB	AIB	AIB	AIB
METHOD BLANK (MB):						
TRIP BLANK (TB):						
FIELD BLANK (FB):						
EQUIP. RINSEATE (ER):						
DATE SAMPLED:		09/28/93	09/28/93	09/29/93	09/29/93	09/29/93
DATE ANALYZED:		10/01/93	10/01/93	10/01/93	10/01/93	10/01/93
	DET. LIMIT					
BENZENE	0.20	ND	ND	ND	ND	ND
TOLUENE	0.20	18	18	18	18	16
ETHYL BENZENE	0.20	2.0	1.9	1.9	1.6	2.2
TOTAL XYLENES	0.20	5.8	5.6	5.6	5.2	14
UNITS		ug/L	ug/L	ug/L	ug/L	ug/L
DILUTION FACTOR		200	200	200	200	200

NOTE:

AIR1AWQ1

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES

SITE:	MMR
LOCATION:	FS-12
DEPTH:	
SAMPLE NUMBER:	LAB BLANK
LAB SAMPLE NO.:	9309255A-06A
MATRIX:	AIR
METHOD BLANK (MB):	
TRIP BLANK (TB):	
FIELD BLANK (FB):	
EQUIP. RINSEATE (ER):	
DATE SAMPLED:	NA
DATE ANALYZED:	10/01/93

	DET. LIMIT	
BENZENE	0.20	(0.001)ND
TOLUENE	0.20	(0.001)ND
ETHYL BENZENE	0.20	(0.001)ND
TOTAL XYLENES	0.20	(0.001)ND

UNITS	ug/L
DILUTION FACTOR	1.0

NOTE:

AIR1AWQ1

12-Apr-94

SITE:
 LOCATION:
 DEPTH:
 SAMPLE NUMBER:
 LAB SAMPLE NO.:
 MATRIX:
 METHOD BLANK (MB):
 TRIP BLANK (TB):
 FIELD BLANK (FB):
 EQUIP. RINSEATE (ER):
 DATE SAMPLED:
 DATE ANALYZED:

DET.
LIMIT

ETHYLENE DIBROMIDE
TPH:
C2-C4** HYDROCARBONS

MMR
FS-12

AS-092893-1
9309255A-01A
A/B

09/28/93
10/01/93

MMR
FS-12

AS-092893-2
9309255A-02A
AIB

09/28/93
10/01/93

MMR
FS-12

AS-092993-1
9309255A-03A
A/B

09/29/93
10/01/93

MMR
FS-12

AS-092993-2
8309255A-04A
AIB

09/29/93
10/01/93

MMR
FS-12

AS-092993-3
9309255A-05A
AIB

09/29/93
10/01/93

UNITS DILUTION FACTOR

ug/L
200

ug/L
200

ug/L
200

ug/L
200

ug/L
200

NOTE:

* TPH REFERENCED TO JET FUEL (MW=156) ** C2-C4 HYDROCARBONS REFERENCED TO PROPANE (MW=44)

AIR1B.WQ1

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES

SITE:	MMR
LOCATION:	FS-12
DEPTH:	
SAMPLE NUMBER:	LAB BLANK
LAB SAMPLE NO.:	9309255A-06A
MATRIX:	AIR
METHOD BLANK (MB):	
TRIP BLANK (TB):	
FIELD BLANK (FB):	
EQUIP. RINSEATE (ER):	
DATE SAMPLED:	NA
DATE ANALYZED:	10/01/93

	DET. LIMIT	
ETHYLENE DIBROMIDE	10	(0.050)ND
TPH*	2.0	(0.010)ND
C2-C4** HYDROCARBONS	2.0	(0.010)ND

UNITS	ug/L
DILUTION FACTOR	1.0

NOTE:

AIR1B.WQ1

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES

SITE:		MMR	MMR	MMR	MMR	MMR
LOCATION:		FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:						
SAMPLE NUMBER:		AS-093093-1	AS-093093-2	AS-093093-3	AS-100193-1	AS-100193-1D
LAB SAMPLE NO.:		9310022B-01A	9310022B-02A	9310022B-03A	9310022B-04A	9310022B-04B
MATRIX:		ΔIB	ΔIB	ΔIB	ΔIB	ΔIB
METHOD BLANK (MB):						
TRIP BLANK (TB):						
FIELD BLANK (FB):						
EQUIP. RINSEATE (ER):						
DATE SAMPLED:		09/30/93	09/30/93	09/30/93	10/01/93	10/01/93
DATE ANALYZED:		10/05/93	10/05/93	10/05/93	10/05/93	10/05/93
OXYGEN	0.002	4.7	6.1	6.5	6.5	6.6
NITROGEN	0.002	86	83	82	83	83
CARBON MONOXIDE	0.002	ND	ND	ND	ND	ND
METHANE	0.002	ND	ND	ND	ND	ND
CARBON DIOXIDE	0.002	9.0	11	11	10	10
ETHANE	0.002	ND	ND	ND	ND	ND
PROPANE	0.002	ND	ND	ND	ND	ND
ISOBUTANE	0.002	ND	ND	ND	ND	ND
BUTANE	0.002	ND	ND	ND	ND	ND
NEOPENTANE	0.002	ND	ND	ND	ND	ND
ISOPENTANE	0.002	0.008	0.010	0.011	0.010	0.010
n-PENTANE	0.002	ND	ND	ND	ND	ND
C6+	0.019	0.17	0.19	0.19	(0.018)0.18	(0.018)0.18
UNITS		%	%	%	%	%
BTU/CU.FT		8.4	9.5	9.5	9.3	9.3
DILUTION FACTOR		1.9	1.9	1.9	1.8	1.8
SPECIFIC GRAVITY		1.0	1.0	1.0	1.0	1.0

NOTE:

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES		MMR	MMR	MMR	MMR
SITE:		FS-12	FS-12	FS-12	FS-12
LOCATION:					
DEPTH:					
SAMPLE NUMBER:		AS-100193-2	AS-100193-3	METHOD SPIKE	LAB BLANK
LAB SAMPLE NO.:		9310022B-05A	9310022B-06A	9310022B-07A	9310022B-08A
MATRIX:		A/B	A/B	A/B	A/B
METHOD BLANK (MB):					
TRIP BLANK (TB):					
FIELD BLANK (FB):					
EQUIP. RINSEATE (ER):					
DATE SAMPLED:		10/01/93	10/01/93	NA	NA
DATE ANALYZED:		10/05/93	10/05/93	10/05/93	10/05/93
OXYGEN	0.002	6.6	7.0	(0.001)99	(0.001)ND
NITROGEN	0.002	84	83	(0.001)100	(0.001)100
CARBON MONOXIDE	0.002	ND	ND	(0.001)92	(0.001)ND
METHANE	0.002	ND	ND	(0.001)84	(0.001)ND
CARBON DIOXIDE	0.002	9.6	10	(0.001)86	(0.001)ND
ETHANE	0.002	ND	ND	(0.001)86	(0.001)ND
PROPANE	0.002	ND	ND	(0.001)87	(0.001)ND
ISOBUTANE	0.002	ND	ND	(0.001)86	(0.001)ND
BUTANE	0.002	ND	ND	(0.001)85	(0.001)ND
NEOPENTANE	0.002	ND	ND	(0.001)85	(0.001)ND
ISOPENTANE	0.002	0.010	0.011	(0.001)86	(0.001)ND
n-PENTANE	0.002	ND	ND	(0.001)85	(0.001)ND
C6+	0.019	(0.018)0.17	(0.018)0.18	(0.001)84	(0.010)ND
UNITS		%	%	%	%
BTU/CU.FT		8.5	9.0	NA	NA
DILUTION FACTOR		1.8	1.8	1.0	1.0
SPECIFIC GRAVITY		1.0	1.0	NA	NA
NOTE:					

AIR2A WQ1

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES

SITE:

LOCATION:

DEPTH:

SAMPLE NUMBER:

LAB SAMPLE NO.:

MATRIX:

METHOD BLANK (MB):

TRIP BLANK (TB):

FIELD BLANK (FB):

EQUIP. RINSEATE (ER):

DATE SAMPLED:

DATE ANALYZED:

DET.
LIMITMMR
FS-12MMR
FS-12MMR
FS-12MMR
FS-12MMR
FS-12

AS-093093-1
9310022A-01A
A/B

AS-093093-2
9310022A-02A
AIB

AS-093093-3
9310022A-03A
A/B

AS-100193-1
9310022A-04A
AIB

AS-100193-1D
9310022A-04B
AIB

09/30/83
10/08/83

09/30/93
10/08/93

09/30/93
10/08/93

10/01/93
10/08/93

10/01/93
10/08/93

ND

ND
12

1.3

3.5

UNITS

Dilution Factor:

ug/L
180

ug/L
180

180 ug/L

180 ug/L

ug/L
180

NOTE:

12-Apr-94

AIF3A.WQ1

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES

PILOT STUDY AIR SAMPLES	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12
SITE:					
LOCATION:					
DEPTH:					
SAMPLE NUMBER:	AS-093093-1	AS-093093-2	AS-093093-3	AS-100193-1	AS-100193-1D
LAB SAMPLE NO.:	9310022A-01A	9310022A-02A	9310022A-03A	9310022A-04A	9310022A-04B
MATRIX:	AIR	AIR	AIR	AIR	AIR
METHOD BLANK (MB):					
TRIP BLANK (TB):					
FIELD BLANK (FB):					
EQUIP. RINSEATE (ER):					
DATE SAMPLED:	09/30/93	09/30/93	09/30/93	10/01/93	10/01/93
DATE ANALYZED:	10/08/93	10/08/93	10/08/93	10/08/93	10/08/93

	DET. LIMIT					
ETHYLENE DIBROMIDE	9.0	ND	ND	ND	ND	ND
TPH*	1.8	2200	2500	2600	2600	2600
C2-C4** HYDROCARBONS	1.8	1.9	2.2	62	ND	ND

UNITS		ug/L	ug/L	ug/L	ug/L	ug/L
DILUTION FACTOR		180	180	180	180	180

NOTE: *TPH REFERENCED TO
JET FUEL (MW=156)**C2-C4 HYDROCARBONS
REFERENCED TO
PROPANE (MW=44)

12-Apr-94

(0.010)ND

1.0

AIR3B.WQ1

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES

SITE:		MMR	MMR	MMR	MMR	MMR
LOCATION:		FS-12	FS-12	FS-12	FS-12	FS-12
DEPTH:						
SAMPLE NUMBER:		AS-092893-1	AS-092893-2	AS-092993-1	AS-092993-2	AS-092993-3
LAB SAMPLE NO.:		9309255B-01A	9309255B-02A	9309255B-03A	9309255B-04A	9309255B-05A
MATRIX:		AJB	AJB	AJB	AJB	AJB
METHOD BLANK (MB):						
TRIP BLANK (TB):						
FIELD BLANK (FB):						
EQUIP. RINSEATE (ER):						
DATE SAMPLED:		09/28/93	09/28/93	09/29/93	09/29/93	09/29/93
DATE ANALYZED:		10/01/93	10/01/93	10/01/93	10/01/93	10/01/93
	DET. LIMIT					
OXYGEN	0.002	3.8	4.2	4.7	4.9	5.3
NITROGEN	0.002	85	84	84	84	84
CARBON MONOXIDE	0.002	ND	ND	ND	ND	ND
METHANE	0.002	ND	ND	ND	ND	ND
CARBON DIOXIDE	0.002	11	12	11	11	11
ETHANE	0.002	ND	ND	ND	ND	ND
PROPANE	0.002	ND	ND	ND	ND	ND
ISOBUTANE	0.002	ND	ND	ND	ND	ND
BUTANE	0.002	ND	ND	ND	ND	ND
NEOPENTANE	0.002	ND	ND	ND	ND	ND
ISOPENTANE	0.002	0.014	0.014	0.012	0.010	0.010
n-PENTANE	0.002	0.002	0.002	ND	ND	ND
C6+	0.020	0.21	0.22	0.20	0.19	0.26
UNITS		%	%	%	%	%
BTU/CU.FT		11	11	10	9.8	13
DILUTION FACTOR		2.0	2.0	2.0	2.0	2.0
SPECIFIC GRAVITY		1.0	1.0	1.0	1.0	1.0
NOTE:	VALUES REPORTED ARE A %					

AIR4AWQ1

AIR TOXICS ANALYTICAL REPORT

12-Apr-94

PILOT STUDY AIR SAMPLES

SITE:	MMR
LOCATION:	FS-12
DEPTH:	
SAMPLE NUMBER:	LAB BLANK
LAB SAMPLE NO.:	9309255B-06A
MATRIX:	AIR
METHOD BLANK (MB):	
TRIP BLANK (TB):	
FIELD BLANK (FB):	
EQUIP. RINSEATE (ER):	
DATE SAMPLED:	NA
DATE ANALYZED:	10/01/93

	DET. LIMIT	
OXYGEN	0.002	(0.001)ND
NITROGEN	0.002	(0.001)100
CARBON MONOXIDE	0.002	(0.001)ND
METHANE	0.002	(0.001)ND
CARBON DIOXIDE	0.002	(0.001)ND
ETHANE	0.002	(0.001)ND
PROPANE	0.002	(0.001)ND
ISOBUTANE	0.002	(0.001)ND
BUTANE	0.002	(0.001)ND
NEOPENTANE	0.002	(0.001)ND
ISOPENTANE	0.002	(0.001)ND
n-PENTANE	0.002	(0.001)ND
C6+	0.020	(0.010)ND

UNITS	%
BTU/CU.FT	NA
DILUTION FACTOR	1.0
SPECIFIC GRAVITY	NA

NOTE:

AIR4A.WQ1

Barnstable County Health and Environmental Laboratory Analytical Report

PILOT STUDY WATER SAMPLES		MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12	MMR FS-12
SITE:						
LOCATION:						
DEPTH:						
SAMPLE NUMBER:		PRI-A-091693-2-D	PRI-I-091793-1	PRI-A-091793-1	PRI-A-091793-2	PRI-I-091893-1
LAB SAMPLE NO.:		93-2027	93-2030	93-2030	93-2034	93-2035
MATRIX:		WATER	WATER	WATER	WATER	WATER
METHOD BLANK (MB):						
TRIP BLANK (TB):						
FIELD BLANK (FB):						
EQUIP. RINSEATE (ER):						
DATE SAMPLED:		09/16/93	09/17/93	09/17/93	09/17/93	09/18/93
DATE RECEIVED:		09/16/93	09/17/93	09/17/93	09/17/93	09/18/93
DATE ANALYZED:		09/16/93	09/17/93	09/17/93	09/17/93	09/18/93
EDB		BDL(0.02)	BDL(0.03)	BDL(0.02)	BDL(0.02)	BDL(0.03)
UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	
Level						
Dilution Factor:						
Percent Solids, (%)						
Sample Weight(grams)						
NOTE:	() DENOTES DETECTION LIMIT					

Barnstable County Health and Environmental Laboratory Analytical Report

[illegible]

Barnstable County Health and Environmental Laboratory Analytical Report

PILOT STUDY WATER SAMPLES

SITE:

LOCATION:

DEPTH:

SAMPLE NUMBER:

LAB SAMPLE NO.:

MATRIX:

METHOD BLANK (MB):

TRIP BLANK (TB):

FIELD BLANK (FB):

EQUIP. RINSEATE (ER):

DATE SAMPLED:

DATE ANALYZED:

DETECTION
LIMIT: mg/L

pH		5.83	5.86	5.84	5.85	5.88
DISSOLVED OXYGEN	0.05	4.40	5.72	3.80	3.20	4.63
DISSOLVED Fe	0.10	22	17	18	19	18
DISSOLVED Mn	0.01	1.46	1.26	1.17	1.24	1.24
TOTAL Fe	0.10	25	31	30	24	24
TOTAL Mn	0.01	1.51	1.45	1.43	1.39	1.23

UNITS

Level

Dilution Factor:

Percent Solids, (%)

Sample Weight(grams)

NOTE:

APPENDIX J
MICROBIAL INSIGHTS, INC.
REPORT

Microbial Insights, Inc.

Comprehensive microbial community analysis

Tom Mattis
Advanced Sciences Inc.
165 Mitchell Rd
Oak Ridge, TN 37830
(615) 483-1274

September 24, 1993

Dear Tom:

Enclosed is the final report for the six samples that we analyzed. We have a very good base line established and there were real differences between the samples. We did not process the Diglycerides for the last four samples because a standard is on back-order. We are not charging for the first two diglycerides because we could not complete the set. I was surprised to see such a strong quinone profile for sample WT17-86. There is good evidence that there is some aerobic respiration occurring in this well.

Give me a call when you have a chance to read the report, and we can discuss the results.

Regards,


Andrew White



Microbial Insights, Inc.

Sample Interpretation

Six samples were analyzed for PLFA, PHA and Quinones. All samples were processed according to Microbial Insights standard operating procedures.

Summary:

The most active microbial community was located in well WT17 at 86 feet. This microbial community had the highest biomass, was the most aerobic, had the least nutritional stress, and contained high portions of Gram negative microbes. Well OW2 appears to be missing some nutrient indicated by high levels of cyclopropyl fatty acids and the high levels of PHA/PLFA. Well OW1 seems to be impacted by a toxic environment as it has the high levels of trans fatty acids and the low diversity in the microbial population.

Biomass:

The samples can be broken into three groups by biomass. As seen on the Biomass graph and on the data summary sheet sample; OW2-86 had the least biomass, while samples OW1-79, OW1-87 and OW2-76 had the mid range of biomass and the highest biomass was WT17-78 and WT17-86. We have seen as little as 10^2 cells per gram soil (deep subsurface) and as much as 10^9 (in surface compost). Sample WT17-78 is in the higher range for subsurface samples.

Nutritional Status:

As outlined on the Data Summary Sheet, cy/w7c indicates the microbes growth phase (higher the ratio the slower the growth) and the w7t/w7c ratio indicates environmental stress. Sample OW1-87 is under the most environmental stress while OW2-76 indicates the slowest growth phase. What is interesting is that sample WT17-86 has the highest biomass and the lowest stress (best nutritional status).

Unbalanced Growth:

This is also outlined in the Data Summary sheet. The slowest growing sample OW2-76' also has the most unbalanced growth as indicated by the high PHA/PLFA ratio. These microbes are most probably missing some essential nutrient. On the other end of the spectrum sample WT17-86' has very balanced growth.

Community Structure:

The microbes that are most active in degrading petroleum hydrocarbons are Gram negatives microbes that contain a large portion of Monoenoic fatty acids. Polyenoic fatty

acids are indicative of Eukaryotes like Protozoa. Protozoa are known predators of bacteria and higher levels may inhibit remediation. It is interesting to note the differences between samples from OW1 and WT17. OW1 has lower levels of Gram negatives versus the Eukaryotes. Samples from WT17 (especially 86 feet) has higher portions of Gram negative bacteria versus the Eukaryotes (see community structure graph).

Well OW1 has the least diverse microbial community while OW2 and WT17 have more diverse communities. OW1's selective microbial community could be the effect of prolonged exposure to toxicity.

Respiratory Quinones: (Aerobic/Anaerobic indications):

Petroleum hydrocarbons are degraded most effectively aerobically. There is strong evidence that aerobic respiration is occurring in well WT17 (86 feet) as the ratio of Benzoquinones/ Napthoquinones is 4.5 to one. The ratio is slightly above one in well OW1 at both depths which indicates aerobic respiration at lower levels than in well WT17 (86 feet).

Sample Relatedness

The final graph is a statistical representation of how the samples are related. The 76 and 78 foot depth samples from well WT17 and OW2 are grouped together. The deeper samples in these two wells are grouped together. Well OW1 at the 79' foot depth is the most different as it groups in the lower right corner.

Microbial Insights, Inc

ASI Inc

Data Summary Sheet

Project: MMR

Sample	OW1-87'	OW1-79'	OW2-76'	OW2-86'	WT17-86'	WT17-78'
Date Collected	8/11/93	8/11/93	8/28/93	8/29/93	9/11/93	9/11/93
grams of sample	76.02	27.27	75.05	75.05	75.76	75.38
Total Pmoles	4,386	2,138	4,870	1,829	9,101	8,178

Biomass Conversion

cells/gram soil

3.40E+06 4.63E+06 3.83E+06 1.44E+06 7.09E+06 6.40E+06

Nutritional Status

cy17:0/16:1w7c	3.6	NC	6.2	2.7	NC	0.9
cy19:0/18:1w7c	0.3	NC	0.8	0.7	0.4	1.1
16:1w7t/16:1w7c	NC	NC	0.13	0.54	NC	0.0
18:1w7t/18:1w7c	1.0	3.2	0.0	0.0	0.0	0.0
Total	4.9	3.2	7.2	3.9	0.4	2.0

Unbalanced Growth

PHB/PLFA

2.7 0.5 4.5 1.0 NC 0.1

Community Structure

TBrSats	ND	ND	3.8	3.1	1.4	8.8
Mono	56.5	46.2	62.9	50.2	60.7	44.7
Poly	9.1	13.7	1.8	5.4	1.3	ND
Br Mono	ND	ND	5.9	1.3	2.9	2.2
Mid Br Sats	ND	ND	1.4	0.6	3.4	4.7
NSats	34.4	40.1	22.0	39.0	30.2	36.4
Others	ND	ND	0.5	0.3	ND	1.6

Benzoquinones	181	41	0	0	1,056	0
Napthoquinones	141	35	0	0	281	26
Benza/Naptho	1.3	1.2	NC	NC	3.8	NC

Microbial Insights, Inc.

Data Summary Sheet notes

Biomass this is a cell equivalent by using the established PLFA content of *E. coli*.

Nutritional Status

cy/w7c The monoenoics (#1w7c) change to cyclopropyl fatty acids (cy#:0) as microbes move from a log to a stationary phase of growth (i.e. stop growing). This ratio varies from organism to organism or environment to environment but usually will fall within the range of .05 (log phase) to 2.5 (stationary phase).

w7t/w7c Bacteria begin making trans fatty acids (w7t) under varying environmental stresses. For example bacteria make w7t fatty acids in the presence of toxic pollutants like phenol. Ratios greater than 0.1 have been shown to indicate the effects of starvation on bacterial isolates. The range is generally between 0.05 (healthy) to 0.3 (starved).

Unbalanced Growth (PHB/PLFA)

This is a ratio of storage lipid (PHB) to membrane lipid (PLFA) from the bacterial cell. Ratios range from ND to 40.00. Ratios greater than 0.2 usually indicate the beginning of unbalanced growth in at least part of the microbial community. Unbalanced growth often occurs in bacterial communities when a necessary nutrient is missing from the environment.

Community Structure

These estimates are based on the percent of the specific PLFA indicative of the different types, or classes of Fatty acid. The Analysis is broken down into several classes of fatty acids.

Normal Branched Saturates (NSats)

These fatty acids are used in the total biomass determinations but not for differentiating between classes of microorganisms.

Terminally Branched Saturates (TerBrSats)

These are common to many gram positive bacteria and can be synthesized by some sulfate reducing bacteria.

Mid-chain Branched Saturates (MidBrSats)

MidBrSats are common in *Actinomycetes* and other gram positive microorganisms. These have also been recovered in some sulfate reducing bacteria.

Monoenoics (Monos)

Monos are in many gram negative microorganisms and some microeukaryotes.

Branched Monoenoics (BrMonos)

BrMonos are common to sulfate reducing bacteria.

Polyenoics (polys)

Polys indicate the presence of eukaryotes.

Gram negative bacteria generally are faster growing, utilize many carbon sources, and adapt quickly to a variety of environments.

Gram positive bacteria are generally slower growing than gram negative bacteria, more resilient, and are capable of degrading many more difficult compounds.

Eukaryotes include organisms like protozoa, alga, and plants. Protozoa in many instances are capable of feeding on bacteria.

Respiratory Quinones:

Benzoquinones are produced by aerobic bacteria with oxygen or nitrate as the terminal electron acceptor.

Napthoquinones are produced with anaerobic respiration. The proportion of benzoquinones to napthoquinones gives an indication of the proportion of aerobic to anaerobic microbial activity.

Definitions:

PLFA Phospholipid Fatty Acids. These are a vital part of the cell membrane of microorganisms.

PHB poly β -hydroxy butyric acid is formed by bacteria accumulating carbon.

NC Not calculated. Because of division by zero or not applicable

ND Not detected.

NA Not applicable

LB Found in the Laboratory Blank

FB Found in the Field Blank

BLB Sample has similar or lower biomass as the laboratory blank

BLF Sample has similar or lower biomass as the field blank

pmoles 10^{-12} moles

nmoles 10^{-9} moles

Microbial Insights, Inc. Data Analysis Spreadsheet

MI Mole percent Table

ASI, Inc.

Project: MMR

Date analyzed	8/16/93	8/16/93	8/31/93	8/31/93	9/13/93	9/13/93
Date Received	8/16/93	8/16/93	8/31/93	8/31/93	9/13/93	9/13/93
Sample taken	8:50	17:20	17:20	9:00	10:02	8:59
Date Collected	8/11/93	8/11/93	8/28/93	8/29/93	9/11/93	9/11/93
Locations	OW1-87'	OW1-79'	OW2-76'	OW2-86'	WT17-86	WT17-78
SAMPLENAME	asi2.2	asi2.3	asi3.3	asi3.4	asi4.2	asi4.3
grams soil	76.02	27.27	75.05	75.05	75.76	75.38
concentration	50	50	50	50	50	50
Dilution	50	50	10	10	100	100
Total Pmoles	4,386	2,138	4,870	1,829	9,101	8,178

Picomole % of each fatty acid found

Terminally Branched Saturates (TerBr Sats)

i14:0			0.2			
14:1						1.3
i15:0			0.5	0.8		
a15:0			0.6	0.4	1.4	2.3
i16:0			0.9	0.8		
i17:0			0.5	0.4		
a17:0			0.8			1.6
br17:0			0.4	0.8		3.6
Total	0.0	0.0	3.8	3.1	1.4	8.8

Monoenoics (Monos)

16:1w8c					5.3	1.7
16:1w9c			1.6			
16:1w7c	2.2		2.2	3.4		1.7
16:1w8c			3.4	0.6		
16:1w7t			0.3	1.8		
16:1w5c			0.2			
cy17:0	7.7		13.9	9.1	17.9	1.6
18:1w9c	21.7	26.6	4.1	13.3	4.7	5.7
18:1w7c	10.7	4.7	21.3	12.9	23.2	16.3
18:1w7t	10.9	15.0				
18:1w5c			0.1	0.7		
cy19:0	3.4		17.4	8.5	9.6	17.7
Total	56.5	46.2	64.5	50.2	60.7	44.7

Polyenoics (Polys)

16:2					1.3	
18:2			1.1	2.8		
18:2w6	9.1	13.7	0.8	2.6		
Total	9.1	13.7	1.8	5.4	1.3	0.0

Branched Monenoics (BrMonos)

br19:1			5.9	1.3	2.9	2.2
--------	--	--	-----	-----	-----	-----

Mid-Chain Branched Staruates (MidBrSats)

10me14:0			0.1			
10me15:0			0.1		3.4	1.4
br16:0						1.2
10me16:0			0.6			1.1

12me16:0			0.3	0.6		
10me18:0			0.4			0.9
Total	0.0	0.0	1.4	0.6	3.4	4.7
Normal Saturates (NSats)						
12:0			0.1			0.7
13:0						2.4
14:0			1.4	0.8	1.0	1.4
15:0			1.1	0.3		1.2
16:0	17.2	20.5	11.7	17.8	20.8	12.4
17:0			1.7	2.4		1.4
18:0	9.7	19.5	4.3	15.2	3.9	10.6
20:0	2.1		0.3	0.7	2.2	4.2
22:0	5.5		0.8	2.0	2.4	2.3
24:0			0.6			
Total	34.4	40.1	22.0	39.0	30.2	36.4
Others						
14:1			0.4	0.3		
15:1						1.6
br16:1			0.2			
Total	0.0	0.0	0.5	0.3	0.0	1.6

Biomass:

PLFA /gram soil	58	78	65	24	120	108
Cells/g soil	3.40E+06	4.63E+06	3.83E+06	1.44E+06	7.09E+06	6.40E+06

Nutritional Status:

cy17:0/16:1w7c	3.6	NC	6.2	2.7	NC	0.9
cy19:0/18:1w7c	0.3	NC	0.8	0.7	0.4	1.1
16:1w7t/16:1w	NC	NC	0.13	0.54	NC	0.0
18:1w7t/18:1w	1.0	3.2	0.0	0.0	0.0	0.0

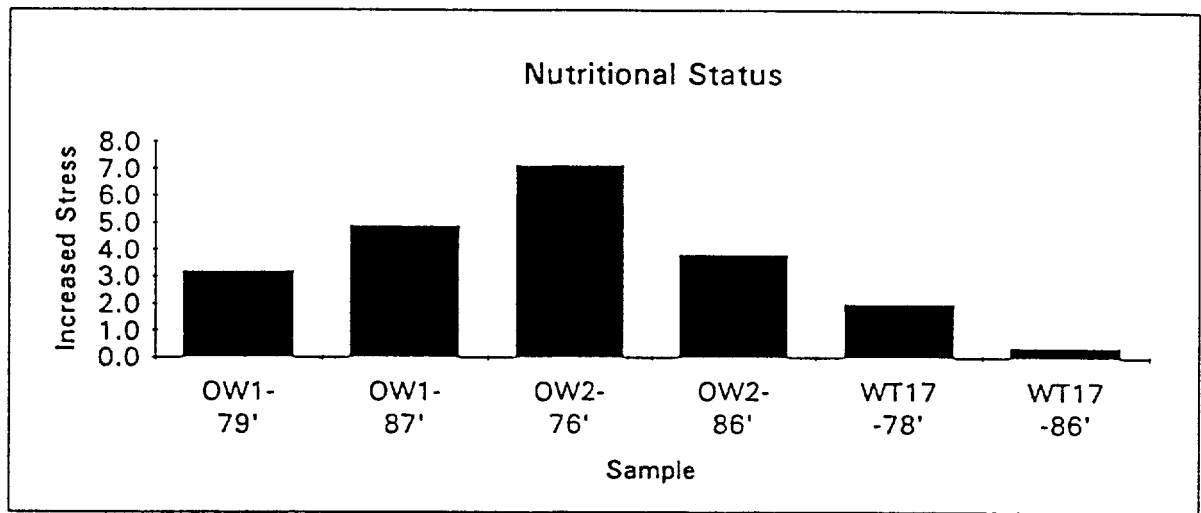
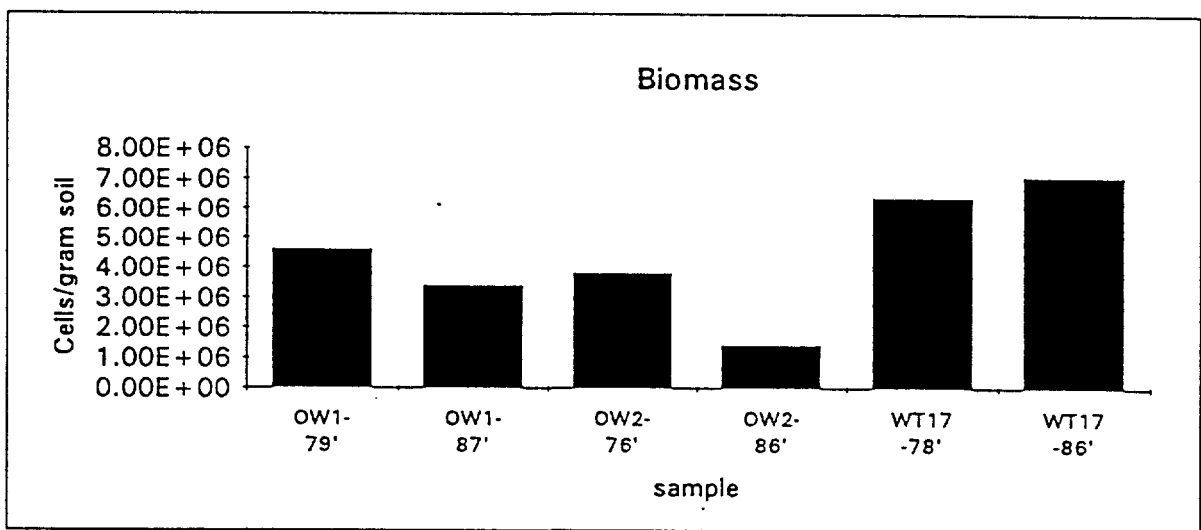
PHA Area	236,932	4,832	16,656	2,080	ND	413
Standard	4,029,831	977,718	153,491	218,210	172,791	96,577
Nmoles PHA	11.8	1.0	21.7	1.9	NC	0.9
PHA/PLFA	2.7	0.5	4.5	1.0	NC	0.1

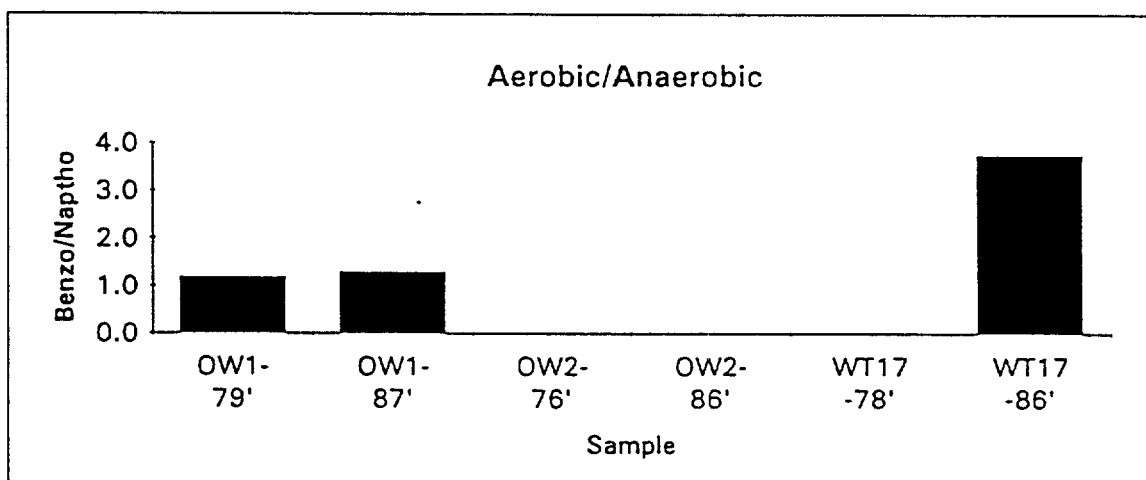
Community Composition:

TerBr Sats	ND	ND	3.8	3.1	1.4	8.8
Monos	56.5	46.2	64.5	50.2	60.7	44.7
Polys	9.1	13.7	1.8	5.4	1.3	ND
BrMonos	ND	ND	5.9	1.3	2.9	2.2
MidBrSats	ND	ND	1.4	0.6	3.4	4.7
NSats	34.4	40.1	22.0	39.0	30.2	36.4
Others	ND	ND	0.5	0.3	ND	1.6

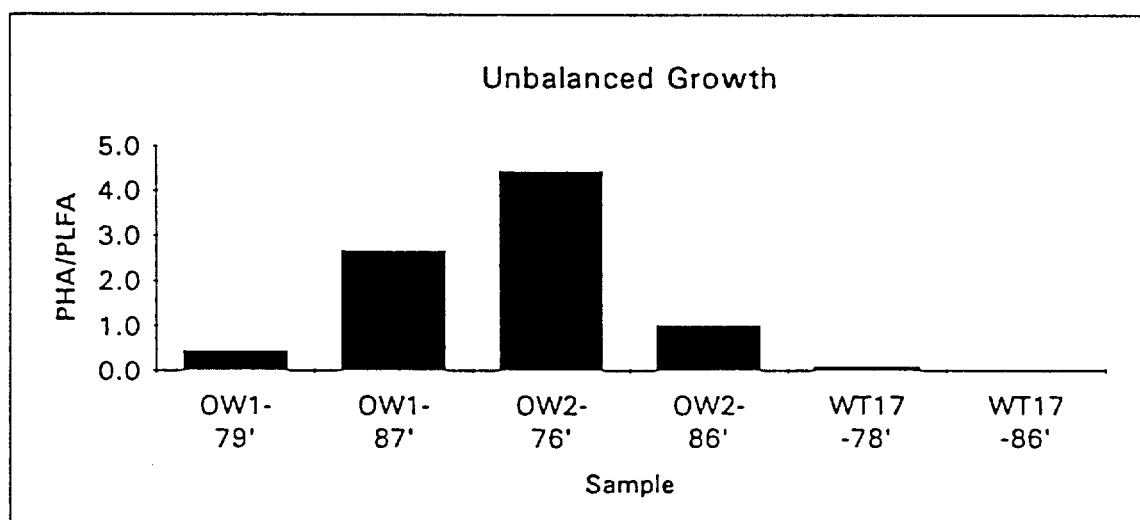
Respiration: (micro grams)

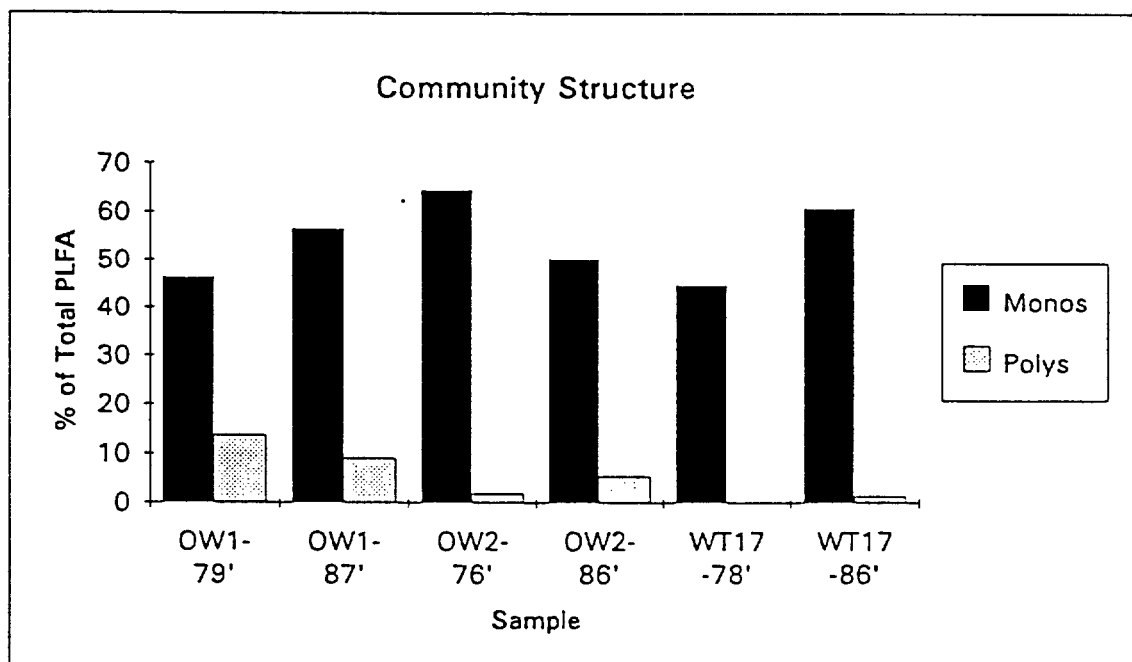
Benzoquinones	181	41	0	0	1,056	0
Napthoquinones	141	35	0	0	281	26
Benza/Naptho	1.29	1.18	NC	NC	3.76	NC

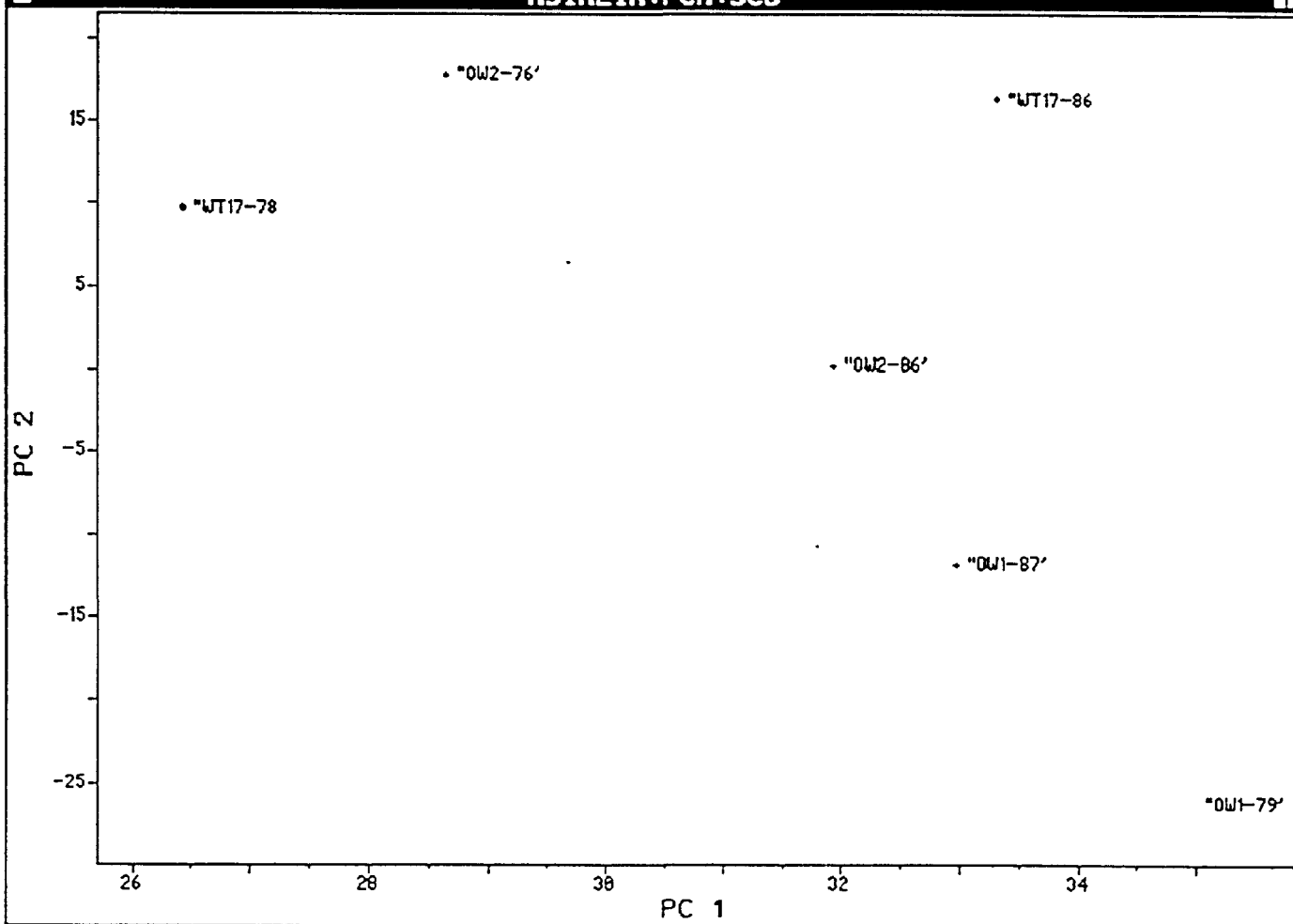




Note; No Benzoquiones were detected in samples OW2-76, OW2-86', and WT17-78







Microbial Insights, Inc.
Quality control report

Company: Advanced Sciences, Inc.

Job# MMR

PLFA, PHA & Quinone Analysis

6 samples was analyzed for PLFA, PHA and Quinones.

All instruments used in the analysis were calibrated and operated within acceptable ranges. The instruments were calibrated according to Microbial Insights, Inc. Standard Operating Procedures (SOP) EQ1.

The following solvents were used during the analysis and were free of contamination.

Chloroform Lot #'s	922972
Methanol Lot #'s	932198
Acetone Lot #'s	165AC
H ₂ O Buffer Lot #	PB010

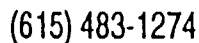
All laboratory blanks were free of contamination.

All data generated through this analysis was acceptable

All required analysis holding times were met.

Samples arrival conditions were acceptable.

No QC or analytical problems were encountered.



PINK - ADVANCED SCIENCES, INC.



Advanced Sciences, Inc.

165 Mitchell Road

Oak Ridge, TN 37830-7919

(615) 483-1274

COC # M-083093-2

Chain of Custody

LAB NAME					TOTAL NUMBER OF CONTAINERS																			
ADDRESS					PRESERVATIVE																			
TELEPHONE					CONTAINER TYPE/ANALYSIS REQUEST																			
SAMPLERS (Signature)					NUMBER OF CONTAINERS																			
SAMPLE NUMBER					DATE																			
TIME					LOCATION																			
MATRIX					NUMBER OF CONTAINERS																			
3.3					3/22/93 1728 OW-2 5011																			
3.6					3/22/93 1740 OW-2 5011																			
3.7					3/23/93 1803 OW-2 5011																			
3.5					3/24/93 0829 OW-2 5011																			
3.1					3/25/93 0843 OW-2 5011																			
3.4					3/29/93 0900 OW-2 5011																			
3.2					3/29/93 0910 OW-2 5011																			
3.8					3/29/93 0931 OW-2 5011																			
3.9					3/29/93 0950 OW-2 5011																			
PROJECT INFORMATION					SAMPLE RECEIPT					RELINQUISHED BY: 1					RELINQUISHED BY: 2					RELINQUISHED BY: 3				
PROJECT: D. HUDSON					TOTAL NO. OF CONTAINERS					(Signature) (Time)					(Signature) (Time)					(Signature) (Time)				
PROJECT MANAGER: D. HUDSON					CHAIN OF CUSTODY SEALS					(Printed Name) (Date)					(Printed Name) (Date)					(Printed Name) (Date)				
CHARGE CODE NO. 7750.804.3.09					REC'D GOOD CONDITION/COLD					(Company) (Date)					(Company) (Date)					(Company) (Date)				
SHIPPING ID. NO. 2752439373					CONFORMS TO RECORD					RECEIVED BY: 1					RECEIVED BY: 2					RECEIVED BY: (LABORATORY) 3				
VIA: Fed EX					LAB NO.					(Signature) (Time)					(Signature) (Time)					(Signature) (Time)				
SPECIAL INSTRUCTIONS/COMMENTS:					RECEIVED BY: 1					RECEIVED BY: 2					RECEIVED BY: (LABORATORY) 3									
DRY ICE IN COOLER.					(Signature) (Time)					(Signature) (Time)					(Signature) (Time)									
MELTED BY SHIPPING TIME.					(Printed Name) (Date)					(Printed Name) (Date)					(Printed Name) (Date)									
					(Company)					(Company)					(Company)									

FORMCOC 2/22/93

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SCI, INC.

(615) 483-1274

COC * m - 2911,3 - 2

Chain of Custody

(015) 403-1274						Gm 9/11/93								TOTAL NUMBER OF CONTAINERS			
LAB NAME <u>Drew White</u>						NUMBER OF CONTAINERS		<u>9</u>		<u>see page 2</u>							
ADDRESS <u>Microbial Insights, Inc.</u>						PRESERVATIVE		<u>N0</u>									
TELEPHONE <u>415-966-7356</u> <u>Knoxville, TN</u>						CONTAINER TYPE/ ANALYSIS REQUEST <u>Q-TIP BIA</u> <u>DATE 9/11/93</u>											
SAMPLERS (Signature) <u>[Signature]</u>																	
SAMPLE NUMBER	DATE	TIME	LOCATION	MATRIX	NUMBER OF CONTAINERS												
WT-17-72-091193	9/11/93	0817	WT-17	SDI	1									1			
WT-17-74-091193	9/11/93	0826	WT-17	SDI	1									1			
WT-17-76-091193	9/11/93	0851	WT-17	SDI	1									1			
WT-17-78-091193	9/11/93	0859	WT-17	SDI	1									1			
WT-17-80-091193	9/11/93	0915	WT-17	SDI	1									1			
WT-17-82-091193	9/11/93	0932	WT-17	SDI	1									1			
WT-17-84-091193	9/11/93	0945	WT-17	SDI	1									1			
WT-17-86-091193	9/11/93	1002	WT-17	SDI	1									1			
WT-17-88-091193	9/11/93	1014	WT-17	SDI	1									1			

DATE 9/11/93
 PAGE 1 OF 2

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY:		RELINQUISHED BY:		RELINQUISHED BY:	
PROJECT: <u>MMR</u>	TOTAL NO. OF CONTAINERS			(Signature)	(Time)	(Signature)	(Time)	(Signature)	(Time)
PROJECT MANAGER: <u>B. Hudson</u>	CHAIN OF CUSTODY SEALS			(Printed Name)	(Date)	(Printed Name)	(Date)	(Printed Name)	(Date)
CHARGE CODE NO. <u>9750, K04.3.07</u>	REC'D GOOD CONDITION/COLD			(Company)		(Company)		(Company)	
SHIPPING ID. NO. <u>2752439340</u>	CONFORMS TO RECORD			RECEIVED BY:		RECEIVED BY:		RECEIVED BY: (LABORATORY)	
VIA: <u>Fed Ex.</u>	LAB NO.			(Signature)	(Time)	(Signature)	(Time)	(Signature)	(Time)
SPECIAL INSTRUCTIONS / COMMENTS: <u>*Dry ICE</u> <u>see page 2 for total</u>				(Printed Name)	(Date)	(Printed Name)	(Date)	(Printed Name)	(Date)
				(Company)		(Company)		(Company)	

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Chain of Custody

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APPENDIX K

REMEDIAL INVESTIGATION REPORT
GEOLOGIC CROSS SECTIONS

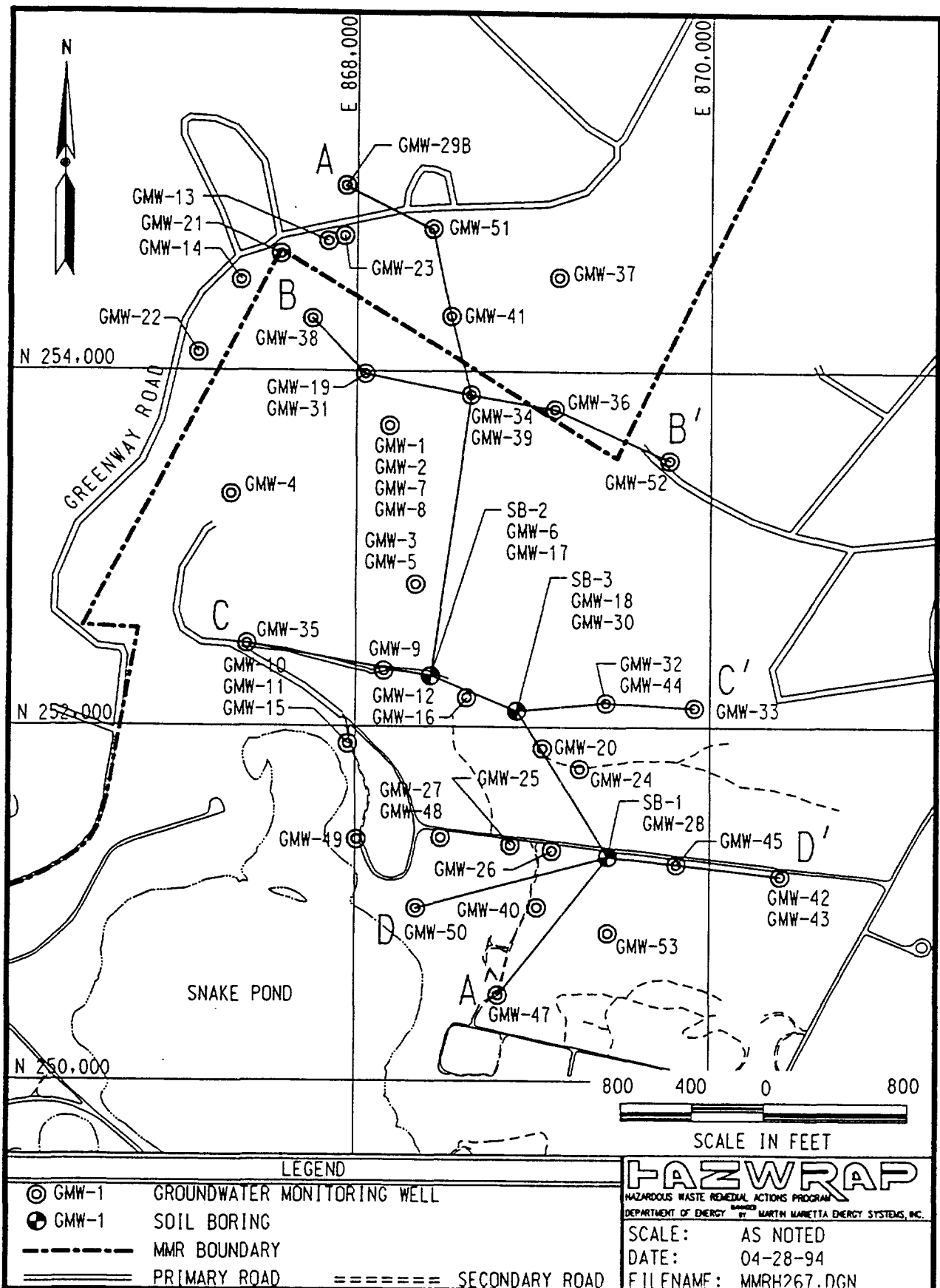


Fig. 3-2. Geologic cross section location map.

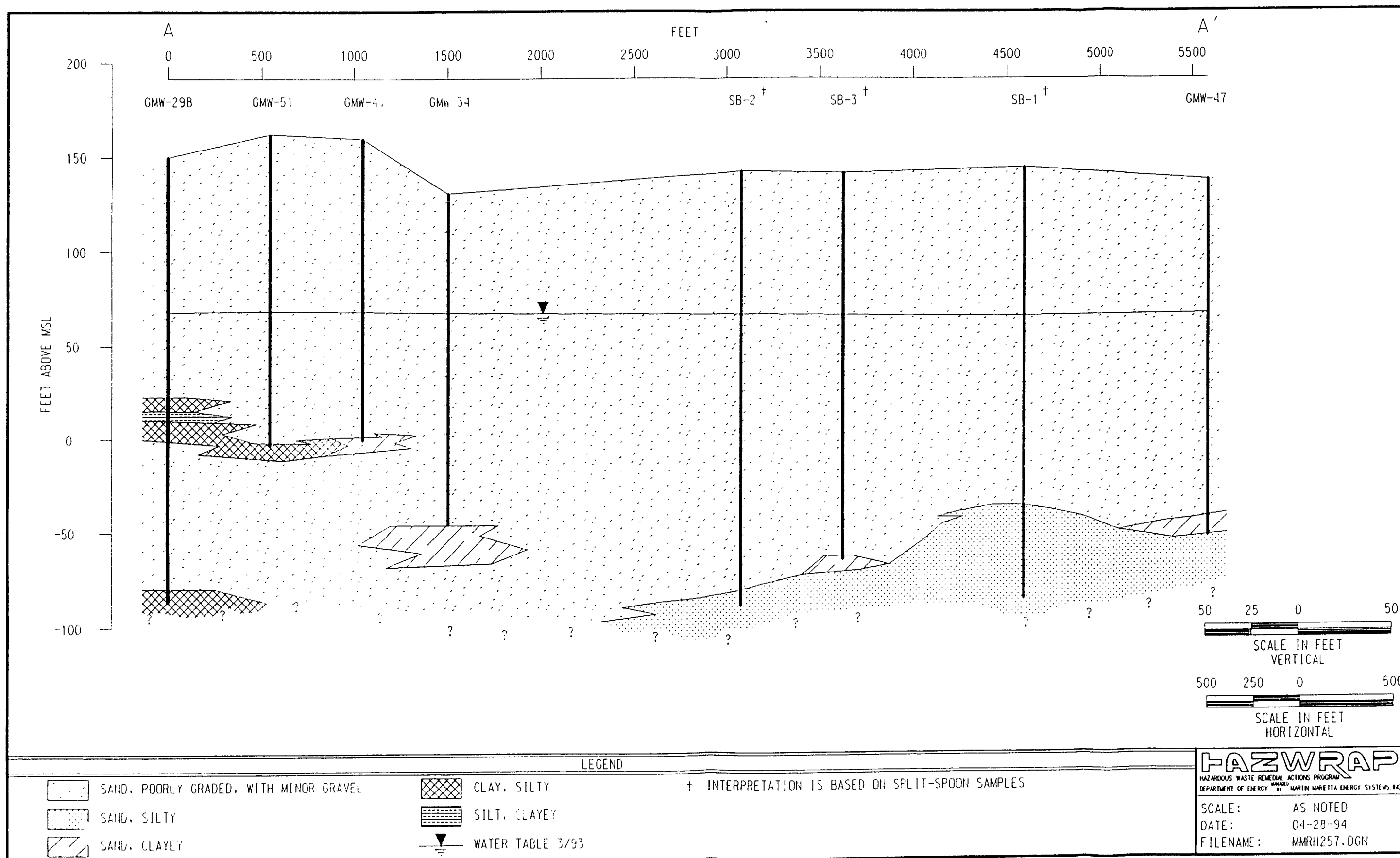


Fig. 3-3. Geologic cross section A-A'.

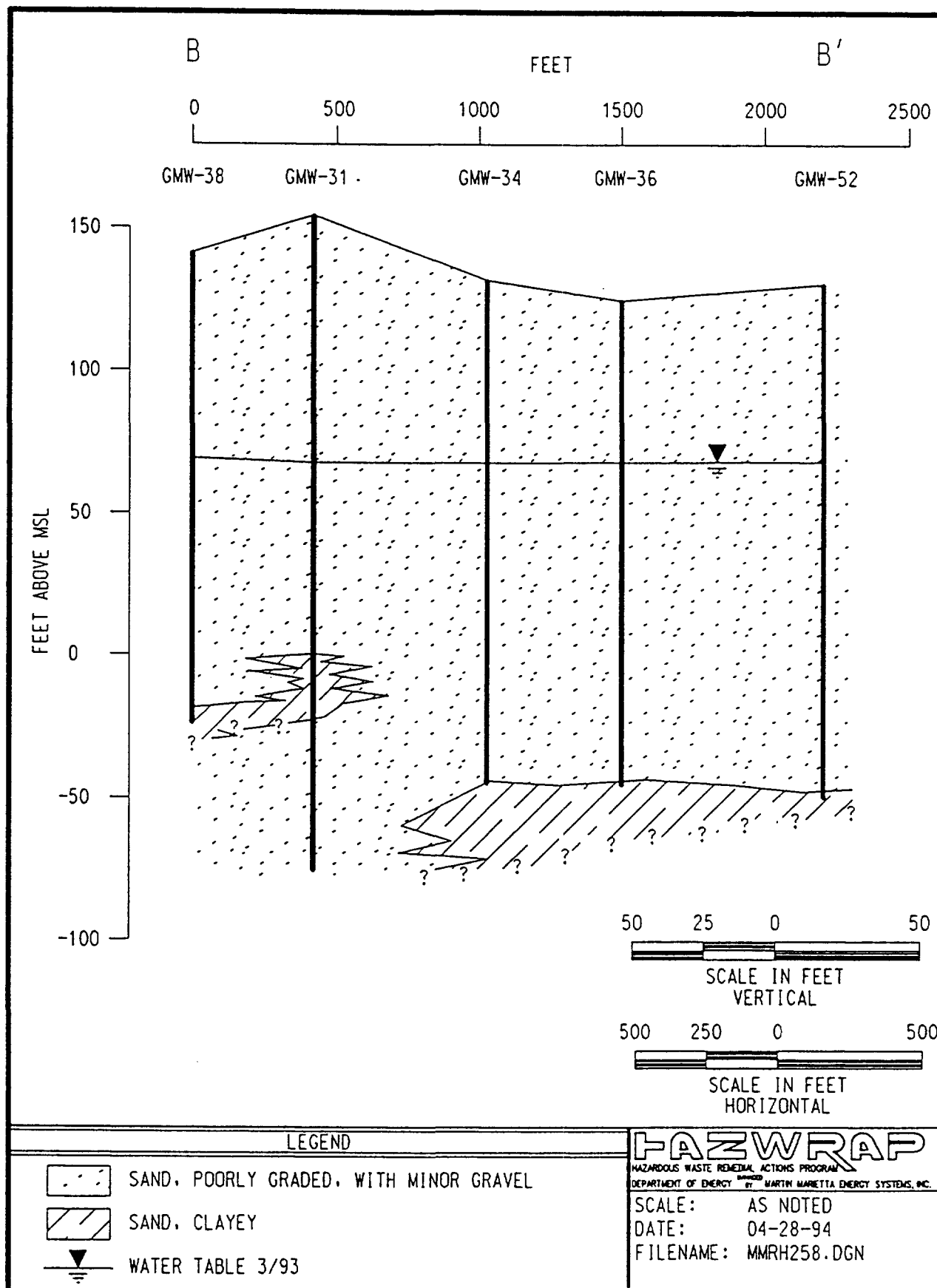


Fig. 3-4. Geologic cross section B-B'.

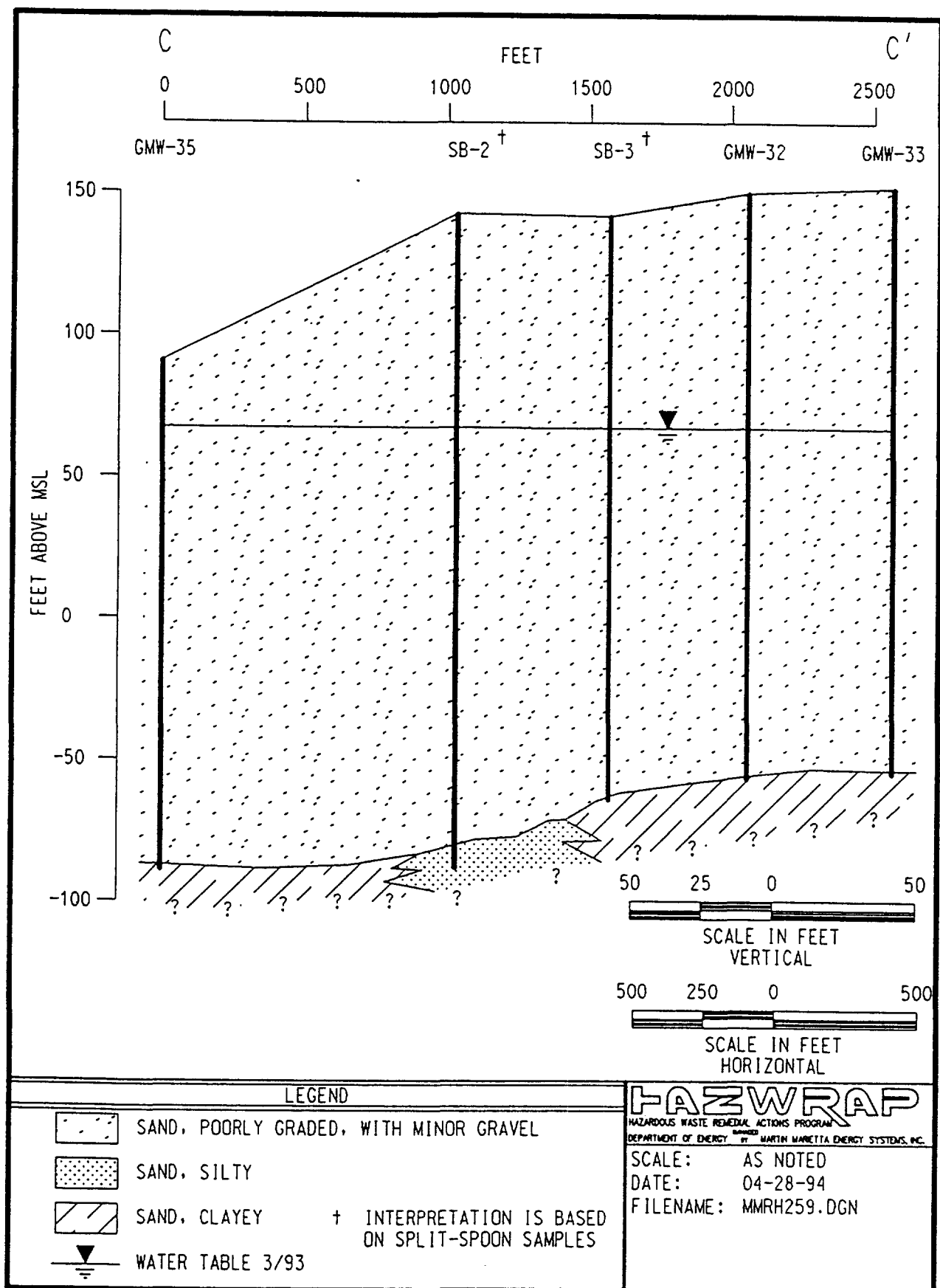


Fig. 3-5. Geologic cross section C-C'.

